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**A REVISION OF THE GENUS
HAEMANTHUS L. (AMARYLLIDACEAE)**

D. SNIJMAN

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HÆMANTHUS AFRICANUS

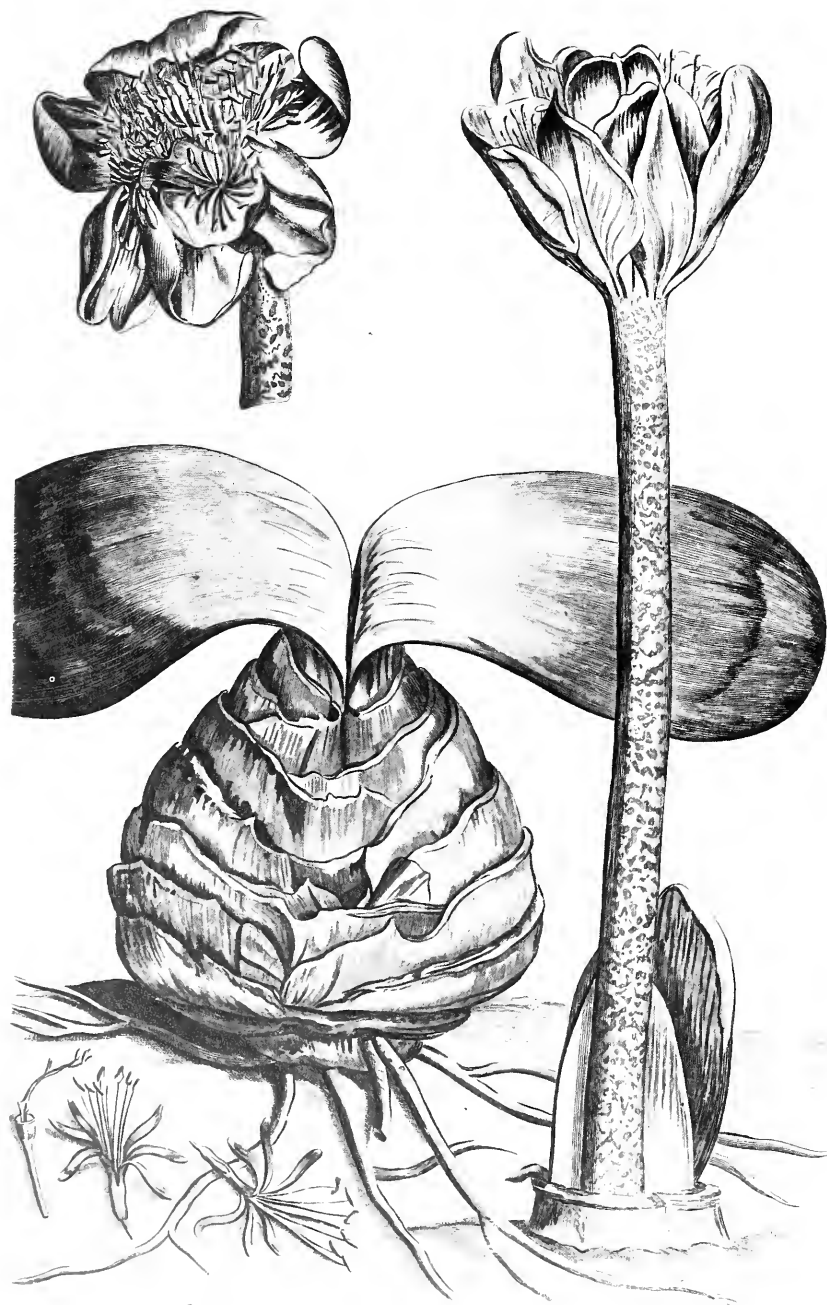


FIG. 1.

The type of *Haemanthus coccineus* L. in Commelin's *Horti Medici Amstelodamensis Rariorum* (1701: t. 64).

**JOURNAL
OF
SOUTH AFRICAN
BOTANY**

**SUPPLEMENTARY
VOLUME NO. 12**

**A REVISION OF THE GENUS
HAEMANTHUS L.
(AMARYLLIDACEAE)**

BY

DEIRDRE SNIJMAN

Compton Herbarium, Kirstenbosch

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A REVISION OF THE GENUS *HAEMANTHUS* L. (AMARYLLIDACEAE)

ABSTRACT

This revision of the southern African genus *Haemanthus* (Amaryllidaceae) is based on studies of herbarium material as well as living plants in their natural habitats and in cultivation. Twenty-one species are recognised and on the basis of morphology, phytogeography and cytology, are placed into four infrageneric groups. Four species and three subspecies are newly described, viz. *H. tristis* Snijman, *H. graniticus* Snijman, *H. dasyphyllus* Snijman, *H. unifolius* Snijman, *H. amarylloides* Jacq. subsp. *toximontanus* Snijman, *H. pubescens* L.f. subsp. *leipoldtii* Snijman and *H. pubescens* L.f. subsp. *arenicolus* Snijman. Fifteen species occur exclusively in the winter rainfall region with the highest concentration in Namaqualand. Only five species are found in the summer rainfall region, with *H. albiflos* Jacq. occurring equally in both regions along the east coast. The genus exhibits a range of bulb and umbel types with the most specialised types in species from Namaqualand and the adjacent western Karoo. Ancestral forms of the genus are believed to have originated in edaphic dry sites, formerly surrounded by mesic vegetation. The advent of summer-dry climates with the resultant increase in aridity subsequently limited species requiring mesic habitats to the east and led to rapid speciation in the arid western regions of southern Africa.

UITTREKSEL

'N HERSIENING VAN DIE GENUS *HAEMANTHUS* L. (AMARYLLIDACEAE)

Hierdie hersiening van die Suider-Afrikaanse genus *Haemanthus* (Amaryllidaceae) is gegrond op die ondersoek van herbariummateriaal sowel as lewende plante in hul natuurlike habitat en gekweekte eksimplare. Die 21 spesies wat erken word, is op grond van morfologiese, fitogeografiese en sitologiese kenmerke in vier infrageneriese groepe geplaas. Die volgende vier nuwe spesies en drie subspecies word beskryf: *H. tristis* Snijman, *H. graniticus* Snijman, *H. dasyphyllus* Snijman, *H. unifolius* Snijman, *H. amarylloides* Jacq. subsp. *toximontanus* Snijman, *H. pubescens* L.f. subsp. *leipoldtii* Snijman en *H. pubescens* L.f. subsp. *arenicolus* Snijman. Vyftien spesies kom uitsluitlik in die winterreënvalstreke voor met die hoogste konsentrasie in Namakwaland. Slegs vyf spesies kom in die somerreënvalgebied voor terwyl *H. albiflos* Jacq. in beide streke langs die ooskus aangetref word. Die genus openbaar 'n reeks bol- en skermtipes met die meer gespesialiseerde tipes in Namakwaland en die aangrensende westelike Karoo. Oervorme van die genus het waarskynlik in edafiese droë plekke wat voorheen omring was deur mesiese plantegroei, ontstaan. Die ontstaan van droë somerklimaattoestande het gelei tot 'n beperking van die mesiese soorte tot die ooste en het tot 'n snelle spesiasie in die droë westelike streke van suidelike Afrika gelei.

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During the period of study I benefited from the interest and assistance of several indigenous bulb growers, of whom I am particularly grateful to Mr. J. W. Loubser. The task of gathering material was also shared by many. Nicky and Fred van Berkel and Ernst van Jaarsveld, are especially thanked for their collections from remote localities.

Finally, I wish to express my sincere appreciation to Mrs. Pauline Fairall for the many unseen ways in which she enabled this work to be completed and to Pauline Perry for her companionship and help on many field trips.

INTRODUCTION

The last comprehensive taxonomic treatment of *Haemanthus* was by Baker in *Flora Capensis* (1896), followed by a brief review of the genus by Friis & Nordal in 1976. The importance of Friis & Nordal's work rests upon their amendment of the generic limits of *Haemanthus* and their reinstatement of the genus *Scadoxus* Raf. Thus, as presently circumscribed, *Haemanthus* includes only species with true bulbs, distichous, fleshy leaves and a diploid chromosome complement of 16. The genus is restricted to southern Africa and Namibia. *Scadoxus* incorporates species with rhizomatous root stocks, thin-textured leaves with a distinct midrib and has a diploid chromosome number of 18. *Scadoxus* is found predominantly in tropical Africa but extends into southern Africa along the east coast as far as the Bredasdorp district in the Cape Province.

Added to Friis & Nordal's contribution to the generic classification are their detailed studies of early literature and typification within *Haemanthus* (Bjørnstad & Friis, 1972). The limitations imposed by poor herbarium material however, prevented a thorough revision of the southern African genus. In their review only 6 species and 3 species complexes were recognised.

In the present work 21 species are recognised, of which 4 species and 3 subspecies are newly described. The work is based upon gross morphology, field studies, observations on living collections and the cytological investigations of Vosa (1984).

METHODS

Field studies were undertaken throughout the winter rainfall region of southern Africa over a period of five consecutive years from 1979. All species in this region were seen in the field, with the exception of *H. nortieri*. In some areas repeated visits were made to the same populations to observe the bulbs in flower, fruit and leaf. Most of the summer rainfall taxa were represented in the living collection at Kirstenbosch.

The preparation of herbarium specimens posed several practical problems. Firstly, the hysteranthous habit of most species necessitated cultivating all collections to obtain complete material. Transplanting the bulbs to the nursery at Kirstenbosch often delayed flowering for approximately two years, while *H. namaquensis* and *H. nortieri* only flowered once in a period of five years. Secondly, the many differences evident between living collections disappeared on drying. Thus most bulbs were photographed and detailed notes on colour, markings, texture and orientation of the leaves and spathe valves were given for each herbarium specimen.

Bulbs of most species were sent to Dr. C. G. Vosa, at the Botany School, Oxford, for cytological examination.

Dried material of the following herbaria was studied (abbreviations according to Holmgren, Keuken & Schofield, 1981) B, BM, BOL, E, GRA, K, MO, NBG, PRE, SAM, STE, WIND. All existing type material was examined.

Finally, great importance was placed on the preparation of the colour illustrations by Ellaphie Ward-Hilhorst and Fay Anderson in order to convey such taxonomically important features as texture, colour and markings of the floral and vegetative parts. All colour illustrations were done from living collections.

MORPHOLOGY

BULB

The bulbs of *Haemanthus* are tunicated and fleshy, ranging in shape from narrowly to broadly ovoid, obclavate or pyriform. New tunics, formed by the leaf-bases, are added each year, while the outermost tunics wither away to form a thin, brown, papery covering. Inherent differences in the manner and extent to which the outer layers wither away have resulted in several distinct bulb forms, illustrated in Figure 2.

In the simplest bulb form as in *H. humilis*, *H. carneus*, *H. montanus*, *H. avasmontanus*, *H. albiflos* and *H. deformis*, there is an accumulation of relatively few outer layers. The tunics are all equal and the bulb remains compressed in the median plane from the juvenile to mature stages (Fig. 2, 1). The bulbs are usually situated close to the soil surface and the tunics are mostly cream-coloured or sometimes flushed with pink but in *H. albiflos* and *H. deformis* they turn green and adopt a photosynthetic role when exposed to light.

In bulbs of all the remaining species, the outer tunics die back unequally, forming a distinct series of overlapping layers. The tunics either die down horizontally, forming a single series of parallel-edged layers [*H. barkerae* (Fig. 2, 2); *H. tristis*; *H. crispus*; *H. unifolius* (Fig. 2, 3); and *H. nortieri*], or the tunics die down obliquely to form two series of parallel-edged layers [*H. coccineus* (Fig. 2, 4); *H. sanguineus* and several other species belonging

FIG. 2.

Bulb morphology in *Haemanthus*; 1 *H. humilis* subsp. *hirsutus* ($\times 1$), bulb compressed in median plane with more or less equal tunics; 2 *H. barkerae* ($\times 1$), bulb more or less round in cross section with unequal tunics in overlapping horizontal layers; 3 *H. unifolius* ($\times 1$), bulb medianly compressed with unequal tunics in overlapping horizontal layers; 4 *H. coccineus* ($\times 1$), bulb laterally compressed with distichous tunics; 5 *H. canaliculatus* ($\times 1$), laterally compressed bulb with thick fleshy distichous tunics. (1 van Jaarsveld 1834; 2 Snijman 132; 3 Snijman 181; 4 Snijman 87a; 5 van Essen s.n.).



1.



2.



3.



4.



5.

EWH.

to their group]. In its most well-developed form, this latter arrangement results in distinctly distichous tunics.

The bulbs of *H. barkerae*, *H. tristis* and *H. crispus* are mostly round in cross section and have well-developed, narrow necks, while in *H. unifolius* and *H. nortieri* the bulbs are compressed in the median plane. For overall morphological and cytological reasons, separate lines of evolution are proposed for the rounded bulbs of *H. barkerae*, *H. tristis* and *H. crispus*, and the medianly compressed bulbs of *H. nortieri* and *H. unifolius*. The bulb form of *H. crispus* appears to be a further developmental stage of the simple form found in *H. humilis*, whereas the bulb type found in *H. unifolius* and *H. nortieri* appears to be a reduced form of the bulb type found in *H. coccineus* and *H. sanguineus* respectively.

The majority of south western Cape and Namaqualand species have thick, distichous tunics. In its most extreme form this has resulted in strong lateral compression of the bulb, as in *H. canaliculatus* (Fig. 2, 5), *H. pumilio* and *H. pubescens*.

Most species form bulblets in the axils of the leaf-bases. Species noted as most readily forming bulblets in nature are *H. albiflos*, *H. humilis*, *H. crispus* and *H. pubescens* subsp. *pubescens*.

The various forms of tunic arrangement described above have quite considerable taxonomic importance but unfortunately are not easily seen in dried material.

FOLIAGE

Of the various foliar structures produced, only the visible assimilatory structures are referred to here as leaves.

The leaves vary in number, shape, pubescence, markings and orientation and are valuable taxonomically. Most species bear 2 leaves each year but in the evergreen species, *H. albiflos* and *H. deformis*, the leaves often persist beyond a year, resulting in 4 to 6 visible leaves. The only other species which sometimes bears leaves for more than a year is *H. canaliculatus*, which is restricted to marshy areas on the south western Cape coast. Occasionally bulbs of *H. crispus*, *H. coccineus*, *H. sanguineus* and *H. humilis* produce 3 foliage leaves. Reduction to a solitary leaf is found in *H. unifolius* and *H. nortieri*, but although the majority of individuals in each of these species are unifoliate, a few are sometimes bifoliate.

Pubescence is characteristic for *H. unifolius* and *H. dasyphyllus* but *H. humilis*, *H. carneus*, *H. crispus*, *H. barkerae*, *H. albiflos*, *H. deformis*, *H. coccineus* and *H. pubescens* have either smooth, lightly or heavily pubescent leaves. Leaf markings are absent in all the summer rainfall species as well as *H. tristis*, *H. amarylloides* and *H. nortieri* from the winter rainfall re-

gion but in all others the leaves usually have some red or dark green bars or speckles on the undersurface.

The leaf edges are mostly flat but the undulate and sinuate margins in *H. crispus* and *H. namaquensis* are reliable taxonomic characters.

INFLORESCENCE

The flowers are borne in an umbel surrounded by membranous to fleshy spathe valves (Fig. 3). The position, number and texture of the spathe valves is taxonomically important. A survey of inflorescence types in related genera of the Amaryllidaceae indicates that the basic umbel form has widely spreading membranous spathe valves, as in the summer rainfall species, *H. humilis*, *H. montanus*, *H. avasmontanus* and *H. carneus*. The Namaqualand and south western Cape species usually have more elaborate and well-developed spathe valves that are firm, erect and bright red. The most specialised condition is found in *H. pubescens* which has the largest and most fleshy spathe valves in the genus. The only Namaqualand species with membranous spreading spathe valves are *H. amarylloides* and *H. lanceifolius*, which on the basis of vegetative characters are nevertheless considered here to be more closely related to the species with dominant spathe valves than to *H. humilis* and its allies.

FLOWER

The *Haemanthus* flower is actinomorphic with segments united below into a tube that is shorter than the segments. The tube varies only slightly in shape and in most species it gradually widens upwards. Only in the winter rainfall region do some species have tubes which are gibbose at the base of each perianth segment. Invariably this character is associated with fleshiness of the spathe valves. The perianth segments vary in shape from lanceolate to narrowly oblong and from widely spreading to erect. The shape and orientation of the perianth segments is fairly constant in most species but is variable in *H. humilis*, *H. coccineus* and *H. sanguineus*.

Colour is a useful taxonomic character. Flowers vary from white to pink in all species from the summer rainfall region. Shades of red predominate in the majority of species from the winter rainfall region but *H. barkerae*, *H. pumilio*, *H. lanceifolius* and *H. amarylloides* typically have pink flowers.

Androecium

The filiform and symmetrically arranged filaments are inserted in the throat of the perianth tube. In all but one species the filaments are as long or longer than the perianth segments. Only *H. carneus* has short filaments included within the perianth. The yellow, oblong, dorsifixed anthers are similar in all species except for small differences in size.

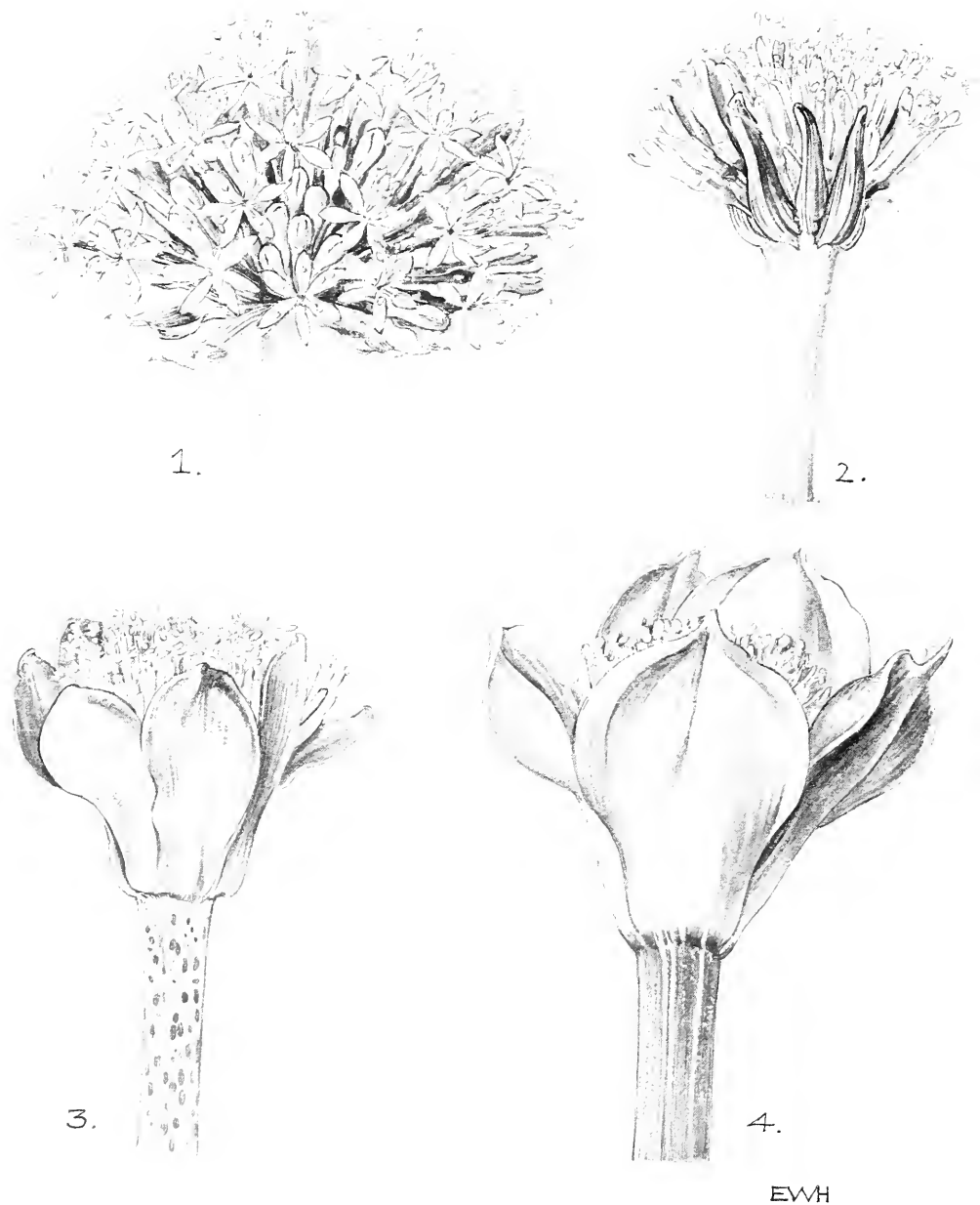


FIG. 3.

Umbel forms in *Haemanthus*; 1 spreading hemispherical umbel of *H. humilis* subsp. *humilis* ($\times 1$); 2 compact obconical umbel of *H. amarylloides* subsp. *toximontanus* ($\times 1$); 3 compact umbel of *H. coccineus* ($\times 1$), with fleshy spathe valves; 4 umbel of *H. pubescens* subsp. *pubescens* ($\times 1$) with extremely thick, fleshy spathe valves. (1 OFS 32/68; 2 W. Olivier 193; 3 Snijman 87a; 4 NBG 28/80).

Gynoecium

The ovary is subglobose and green or flushed with pink or red and is similar in all species. The style is filiform and apically shortly trifid. It reaches to about the apex of the anthers.

FRUIT AND SEED

The fruit of *Haemanthus* is a globose to ellipsoidal berry which when ripe is soft, pulpy, often translucent and aromatic. The berries range in colour from white to yellow or orange in *H. humilis*, *H. albiflos* and *H. deformis* but the colour is unrecorded in the remaining summer rainfall species. Berries of the winter rainfall species vary from white to pink or occasionally red depending on light intensity and maturity of the berries.

The seeds are succulent, smooth and green to wine-red.

GEOGRAPHY

Of the 21 *Haemanthus* species, 15 are found almost exclusively in the winter rainfall region and 5 in the summer rainfall region of southern Africa. Only the eastern coast species *H. albiflos* occurs in both regions, extending from Zululand to near Still Bay in the southern Cape.

The highest species concentration is in Namaqualand (Figs 4 and 5), an area of extreme aridity. Particularly high concentrations are found in the latitude-longitude degree squares 2917 and 3017, i.e. the Springbok and Hondeklipbaai grids, each of which has 7 species, one being endemic. Another particularly rich area is that covered by the degree squares 3018 (Kamiesberg) and 3118 (Vanhynsdorp). Each of these has 5 species including 2 local endemics in the Vanhynsdorp grid.

In the south western Cape, species concentration decreases from 4 in the Nieuwoudtville area to 3 in the southern Cape. *Haemanthus pumilio* and *H. canaliculatus*, which are endemic to the Stellenbosch flats and the coast near Betty's Bay, provide good examples of vicarious species. It is probable that their ancestor was spread continuously from the Cape flats to south of Cape Hangklip but climatic changes during the Pleistocene brought about geographical isolation with the subsequent development of two distinct species. Similar interpretations are given for other taxa in that area (Rourke, 1972; Bremer, 1976).

A noteworthy area of species concentration in the eastern regions is that of the degree squares 3325 (Port Elizabeth) and 3326 (Grahamstown) which have 4 species each. Gibbs Russell and Robinson (1981) suggest that high species concentration in the eastern Cape is due to the presence of many species at the extremes of their ranges rather than to any local speciation due to peculiar conditions here. This is consistent with the pattern in *Haemanthus*.

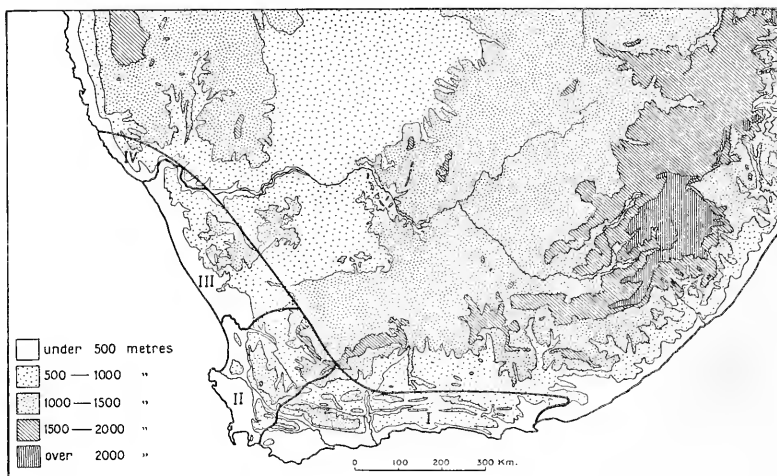


FIG. 4.

The phytogeographic regions into which the winter rainfall region has been divided here. I Southern Cape. II South western Cape. III Namaqualand and western Karoo. IV Southern Namibia.

Species concentration in the summer rainfall region is relatively uniform in comparison to that of the western Cape. Relatively few widespread species occupy either the inland highveld grassland regions (*H. humilis*, *H. carneus*, *H. montanus* and *H. avasmontanus*) or the coastal belt (*H. albiflos* and *H. deformis*). The extremely localised and apparently disjunct distribution of the central Namibian species, *H. avasmontanus*, is probably a reflection of undercollecting. The same reason probably accounts for the distribution gap in the central Karoo of *H. humilis*.

ECOLOGY AND HABITAT

Since Dahlgren's (1968) detailed account of the dependence of many species on edaphic factors in the Cape region, further studies have confirmed the importance of soil types to species distribution in this region (Goldblatt 1976, 1979). The only *Haemanthus* species with distributions corresponding entirely to geological formations are *H. graniticus* and *H. namaquensis* which occupy the coarse granitic soils of Namaqualand; *H. pubescens* which is restricted to marine and aeolian sands of the western coast, and *H. barkerae* which is limited to the heavy clay soils of the Dwyka and Eccra series of the western Karoo, as well as the dolerite intrusions of that area. Other species are either widely distributed and occur over a range of

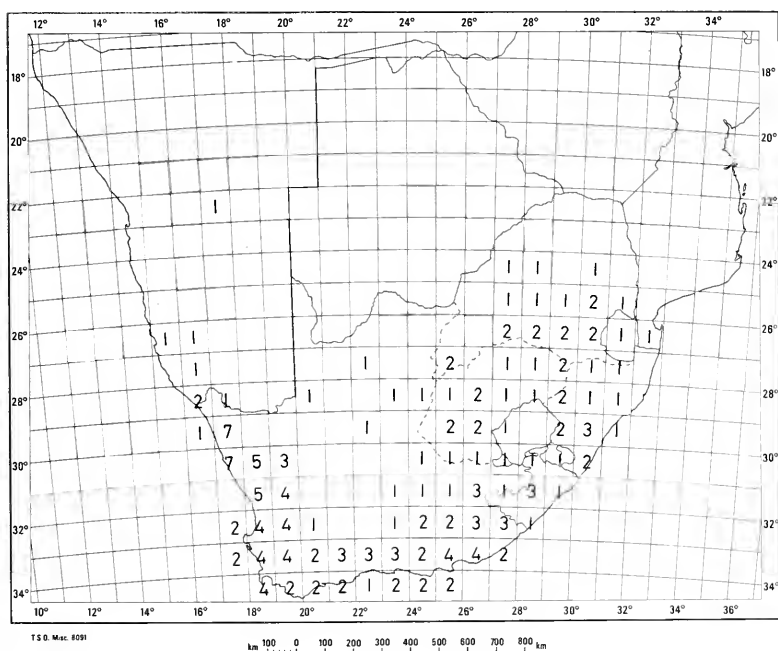


FIG. 5.

Concentration of species of *Haemanthus* in geographical degree squares.

soil types or have extremely restricted distributions which suggests a greater dependence on other factors.

Species with the most restricted distributions are *H. canaliculatus*, *H. pumilio* and *H. nortieri* which occupy small, flat, seasonally waterlogged areas; *H. tristis* which is limited to seasonal washes in the extremely arid Tanqua Karoo; and *H. avasmontanus* which grows on micaceous schist ledges in central Namibia. The widely ranging species usually favour south-facing rocky slopes where additional moisture is available (*H. coccineus* and *H. humilis*), or seasonal watercourses and vleis (*H. montanus* and *H. amarylloides*).

Haemanthus albiflos and *H. deformis* are the most shade-loving of all the species and are found on the equable east coast. *H. albiflos* favours the protection of shrubs and bushes, whereas *H. deformis* also grows on shady ledges.

FLOWERING

Flowering occurs at different times in the summer and winter rainfall species. Most species in the inland regions of the summer rainfall region flower from October to February, whereas *H. albiflos* and *H. deformis* from the east coast have a prolonged flowering period during the winter months, mostly April to October. All species in the west of the winter rainfall area are characteristically autumn-flowering (March-April), while species in the southern Cape tend to flower in February.

Apart from the above flowering patterns, several small but noteworthy differences in flowering patterns are evident in populations in Namaqualand.

The climate of Namaqualand is characterised by marked irregularity in rainfall. If the rainfall at the beginning of autumn is widespread then most species in the higher lying regions of Namaqualand flower almost simultaneously throughout their ranges. However, in years when the rainfall is scattered and of short duration, only isolated populations within the species' distributions are known to flower. This suggests that fluctuations in the availability of moisture here have been critical in breaking up the continuity of populations in the past.

Of those species which grow in the fynbos of the south western Cape, only *H. canaliculatus* is dependent upon fire to induce flowering. The other species, *H. coccineus* and *H. sanguineus*, flower fairly regularly but are nevertheless stimulated by summer fires to produce particularly good displays. (See further discussion under *H. canaliculatus*).

Observations in the field as well as on bulbs in cultivation suggest that the role of the firm, erect spathe valves, as found in *H. pubescens* and *H. coccineus*, is a protective one, principally against desiccation. Flowers which are loosely surrounded by membranous spathe valves soon wither in periods of high temperatures, whereas those surrounded by firm, erect spathe valves, endure for a longer time. This is particularly evident in sympatric populations of *H. amarylloides* subsp. *polyanthus* and *H. crispus* observed at Grootvlei, which have contrasting spathe valve-types. Furthermore, fleshiness of the spathe valves appears to have a high selective value for species in the most extreme climates. The three species, *H. coccineus*, *H. crispus* and *H. pubescens* subsp. *arenicolus*, which occupy the arid coastal plain between Hondeklipbaai and Port Nolloth, which receives less than 100 mm precipitation annually, all have fleshy, erect spathe valves.

Virtually nothing is known of the pollination biology of *Haemanthus*. The flowers produce copious nectar. The bees and butterflies which have been seen visiting the flowers are undoubtedly the main pollinators (Fig. 6), although ants are also greatly attracted to the flowers. While the protective role of the fleshy spathe valves has been emphasised above, it is noteworthy that the elaboration of these structures is associated with the predominance



FIG. 6.

The Cape honey bee (*Apis mellifera* subsp. *capensis*) alighting on the flowers of *H. pumilio*.



FIG. 7.

Infructescences of *H. barkerae* indicating their recurved peduncles and mature berries ($\times 1$).

of brilliant red colours. Thus it seems likely that the different spathe valves and umbel forms also reflect differences in pollination strategies.

SEED DISPERSAL

During fruit development the peduncle lengthens and finally bends under the weight of the mature berries, which then become detached on the soil surface. Marloth (1915) states that the berries are eaten by birds, porcupines and baboons. However, my observations suggest that apart from some minor chewing of the berries and peduncles by rodents, there is little evidence to indicate that the seeds are dispersed by animals. They are too soft to survive in the digestive tracts of animals, but may be dispersed by rodents transporting fruits for short distances to their nests.

In most of the populations studied it seems likely that seeds are washed along seasonal watercourses and down rocky inclines, or else merely the lengthening of the peduncle distances the seeds from the parent plant (Fig. 7).

EVOLUTION

Stebbins (1952) and Axelrod (1967, 1972) have commented extensively on speciation and evolution in arid climates. It is generally proposed that populations near the margin of their range tend to become fragmented under conditions of seasonal drought. Regular isolation of these populations during climatic fluctuations, together with diversity in topography, favours morphological divergence and the development of distinct forms, races or species. Furthermore, in dry regions a variety of specialised morphological features are strongly selected, which enable individuals to survive periods of drought.

Evolution of *Haemanthus* appears to correspond well with this model.

Firstly, the greatest concentration of species is in the most arid region of southern Africa, namely Namaqualand; an area characterised by its broken topography. Secondly, many of these species have relatively restricted distribution ranges and are closely allied; whereas most species from the more temperate climates of the southern and eastern parts of southern Africa, have wide, more or less continuous distribution ranges. In addition, most species in the arid west have the most specialised morphological characters, particularly *H. pubescens* with its extremely developed spathe valves and large bulbs; and *H. nortieri* and *H. unifolius*, which exhibit a reduction in leaf number. In contrast, species from the more equable eastern parts of the country have the least specialised characters. *Haemanthus humilis* has a combination of simple floral and vegetative parts, whereas in *H. albiflos* the primitive evergreen habit is combined with slight elaboration of the floral parts. It seems likely therefore that increasing aridity in the west and fluc-

tuating climatic conditions have played an important role in determining the evolutionary history of *Haemanthus*.

In summary it seems that *Haemanthus* evolved from *Scadoxus* during a period which was wetter than at present. *Scadoxus* persisted in moist equable climates but the ancestral forms of *Haemanthus* probably favoured whatever dry sites were available, either rainshadows or exposed rocky ridges surrounded initially by mesic vegetation. The advent of summer-dry climates in southern Africa within the last 5 million years provided opportunities for evolution within taxa preadapted to drier conditions (Axelrod & Raven, 1978). Thus taxa of *Haemanthus* requiring summer rain were gradually restricted eastwards while the increased aridity in the west caused rapid speciation and gave rise to many of the most specialised species in that area. Species appear to have radiated along two major pathways, one leading westwards across the somewhat flat interior of southern Africa and the other along the mountain chains running parallel to the west coast.

On the basis of phytogeographical, morphological and cytological evidence, four major groups of species are evident (Table 1).

They are as follows:

(a) The *H. humilis* group has only summer rainfall species with simple characters, i.e. bulbs with more or less even tunics and spreading umbels surrounded by membranous spathe valves. The most widespread species is *H. humilis* which also covers the widest ecological range. It seems likely that *H. humilis* is close to the ancestral forms of *Haemanthus*.

(b) The *H. crispus* group comprises only four species confined to Namaqualand and the western Karoo. Species of this group have slightly more specialised characters and are thought to represent a further development from the previous group. The bulbs consist of unequal tunics arranged mostly in a single series of parallel-edged layers. The spathe valves are spreading in *H. barkerae* and *H. tristis* but remain erect in *H. crispus* and *H. namaquensis*. On the basis of cytological evidence (Vosa, 1984), *H. namaquensis* has been included here but its natural position is not yet certain.

(c) The *H. albiflos* group consists of only two evergreen species, both from the east coast of southern Africa. These species have the basic bulb form but the erect spathe valves which surround the umbel are slightly more specialised than in the *H. humilis* group.

(d) The *H. coccineus* group comprises only species from the winter rainfall region. It is the largest group and includes some of the most specialised species. *Haemanthus coccineus* and *H. sanguineus* are widely ranging and variable but the remaining species are more narrowly defined morphologically and show restricted distribution ranges, mostly along the higher lying areas of Namaqualand and the western Karoo, and to a lesser extent on the

flats between Stellenbosch and Betty's Bay. All species have bulbs with unequal more or less distichous tunics. Exceptions are *H. nortieri* and *H. unifolius* which have bulbs reduced to a single series of horizontally-edged overlapping tunics. In addition these two species bear only a solitary leaf. Further specialisations in most species are the firm erect spathe valves which surround the flowers. Only in *H. pumilio*, *H. lanceifolius* and *H. amarylloides* is this feature absent. The species with the most specialised floral characters is *H. pubescens* which has extremely fleshy erect spathe valves.

TABLE 1.
Groups of closely allied species of *Haemanthus*

<i>H. humilis</i> group	
1. <i>H. humilis</i> Jacq.	3. <i>H. montanus</i> Baker
2. <i>H. carneus</i> Ker Gawler	4. <i>H. avasmontanus</i> Dinter
<i>H. crispus</i> group	
5. <i>H. crispus</i> Snijman	8. <i>H. namaquensis</i> R. A. Dyer
6. <i>H. barkerae</i> Snijman	
7. <i>H. tristis</i> Snijman	
<i>H. albiflos</i> group	
9. <i>H. albiflos</i> Jacq.	
10. <i>H. deformis</i> Hook f.	
<i>H. coccineus</i> group	
11. <i>H. sanguineus</i> Jacq.	18. <i>H. coccineus</i> L.
12. <i>H. canaliculatus</i> Levyns	19. <i>H. dasyphyllus</i> Snijman
13. <i>H. pumilio</i> Jacq.	20. <i>H. unifolius</i> Snijman
14. <i>H. lanceifolius</i> Jacq.	21. <i>H. pubescens</i> L.f.
15. <i>H. amarylloides</i> Jacq.	
16. <i>H. graniticus</i> Snijman	
17. <i>H. nortieri</i> Isaac	

CYTOLOGY

The studies of Vosa (1984), based on material gathered during the present taxonomic study, indicate that *Haemanthus* is chromosomally uniform. Of the 20 taxa investigated, all have a chromosome number of $2n = 16$ and on the basis of chromosome morphology they fall into two discrete groups. The large and variable species *H. albiflos* and *H. humilis* possess two distinct chromosome races. For a detailed discussion see Vosa (1984).

HYBRIDS

In nature hybrids are not easy to distinguish unless the parents are quite distinct morphologically. The only indication that natural hybridisation may

sometimes occur was gained from observations made at a newly burnt site on the Simonsberg near Stellenbosch, where large numbers of bulbs of *H. coccineus* and *H. sanguineus* were in flower. Although both species normally flower at slightly different times and are usually easy to tell apart in the south western Cape, the division between these populations was blurred; a pattern which possibly indicates sporadic crossing when both species are induced to flower simultaneously by fire.

Few garden hybrids have been recorded. The only known crosses are *H. albiflos* × *H. coccineus* (Hannibal, 1948); *H. albiflos* × *H. sanguineus* and *H. humilis* subsp. *hirsutus* × *H. sanguineus* (Loubser, pers. comm.).

TAXONOMY

HISTORICAL BACKGROUND

Bulbs of *Haemanthus* were amongst the first plants gathered at the Cape of Good Hope and subsequently cultivated in the gardens of Europe. The earliest known description of *Haemanthus* is in de l'Obel (1605), where the plants are given the phrase name *Narcissus Africanus sive Narcissus exoticus*. The accompanying illustrations suggest that the bulbs probably belonged to the species *H. coccineus* and *H. sanguineus*.

New phrase names were proposed for what were probably the same species in several other publications of the 17th Century (Ferrari, 1633; Bodaeus a Stapel, 1644; Colonna, 1651 and Morison, 1680).

The name *Haemanthus* was first proposed by Hermann in 1687 and thereafter appeared in many publications in the form of *Haemanthus africanus* (Tournefort, 1700; Commelin, 1701; Boerhaave, 1720).

In 1753 when the first edition of Linnaeus' *Species Plantarum* appeared, *H. coccineus* was recognised but few additions were made to the genus prior to 1797. The publication of Jacquin's beautifully illustrated volumes of *Plantarum rariorum horti caesari Schoenbrunnensis* (1797, 1804) added 12 new species to *Haemanthus*. The next major contribution was that of Herbert (1837) who described 7 new species, mostly from the collections of Masson and Burchell. Baker (1888, 1896) was the last single author to add several more species. These were based principally upon collections from the previously unexplored interior regions of southern Africa. Since then only 6 additional taxa have been added to the genus, all from the south western Cape, Namaqualand and Namibia.

TAXONOMIC CONCEPTS

In past literature, *Haemanthus* has been split into several genera, namely *Leucodesmis*, *Perihema* and *Serena* by Rafinesque (1838) and thereafter into *Haemanthus*, *Melicho* and *Diaclis* by Salisbury (1866), but mostly the genus

has been subdivided. The rank of the subdivisions has alternated between subgenus and section, a change being made in almost each new treatment of the genus (Roemer, 1847; Baker, 1888, 1896; Pax & Hoffman, 1930; Traub, 1963; and Friis & Nordal, 1976). Apart from Roemer, who gives no indication as to what features distinguish his sections, all other authors used floral characters for their subdivisions. The criteria used were the position of the spathe valves and the position of the perianth segments. Thus two subgenera or sections were recognised; one consisting of species with spreading spathe valves and spreading perianth segments, the other having species with erect spathe valves and erect perianth segments.

The first to suggest that this long accepted division was possibly too rigid, were Friis & Nordal (1976). This opinion is reinforced by the present systematic arrangement in which several closely allied species of the Cape show a wide range of umbel shapes, varying from very spreading to compact and erect (namely *H. lanceifolius*, *H. amarylloides* and *H. sanguineus*). In this study, the possibility of using selected combined characters rather than single characters to delimit infrageneric taxa, has not been overlooked but ultimately preference has been given to recognising what is considered to be the natural groups shown in Table 1, in a purely informal manner.

Species delimitations in approximately half the number of species are clear cut and the species are easily defined by several independent characters. The remaining species however, are more complex and their treatment is unavoidably subjective. In *H. amarylloides* and *H. pubescens* I have indicated that the present treatment is preliminary and awaits further study. In species with several regional races but equally many intermediates, these have been discussed in the text but have not been assigned rank (*H. coccineus* and *H. sanguineus*). Where closely related but morphologically distinct forms have distinct distribution ranges with little overlap and few intermediates, they have been given subspecific rank (e.g. the subspecies of *H. humilis*). Geographically isolated taxa, separated only by small quantitative differences, are also treated as subspecies (e.g. the subspecies of *H. pubescens* and *H. amarylloides*).

TAXONOMIC TREATMENT

Haemanthus L., Sp. Pl.: 325 (1753); Herbert, Amaryllid.: 232 (1837) pro parte; Baker, Handb. Amaryllid.: 62 (1888) and in Flora Cap. 6: 229 (1896) pro parte; Bjørnstad & Friis in Norw. J. Bot. 19: 190 (1972) pro parte; Friis & Nordal in Norw. J. Bot. 23: 64 (1976). Type species: *H. coccineus* L. (lectotype, designated by Hitchcock & Green, 1929).

Leucodesmis Raf., Flora Telluriana 4: 19 (1838). Type species: *L. pubescens* (L.f.) Raf. (holotype), based on *H. pubescens* sensu Raf. (non. L.f.) = *H. albiflos* Jacq.

Perihema Raf., Flora Telluriana 4: 20 (1838). Type species: *P. coarctata* (Jacq.) Raf. (holotype), based on *H. coarctata* Jacq. = *H. coccineus* L.

Serena Raf., Flora Telluriana 4: 20 (1838). Type species: *S. carnea* (Ker Gawler) Raf. (designated here as lectotype), based on *H. carneus* Ker Gawler.

Melicho Salisb., Gen.: 130 (1866). Type species: *H. amarylloides* Jacq. (lectotype, Bjørnstad & Friis, 1972).

Diacles Salisb., Gen.: 130 (1866). Type species: *H. pubescens* sensu Ker Gawler (non. L.f.), designated here as lectotype = *H. albiflos* Jacq.

Deciduous or evergreen geophytic herbs. *Bulbs* ovoid to pyriform, 15–150 mm in diameter, varying from round in cross section to medianly or laterally compressed; tunics fleshy, equal or unequal, in horizontal layers or distichously arranged, cream-coloured or occasionally green. *Leaves* 1–6, mostly 2, present with the flowers or following the flowers, distichous, erect, recurved or prostrate; blades varying from ligulate to lanceolate, lingulate or elliptical, immaculate or with red and dark green blotches and bars, glabrous or pubescent, thick-textured. *Inflorescence* a compact or spreading umbel, 30–100 mm across. *Peduncle* slender to stout, up to 370 mm long, more or less compressed, glabrous or pubescent, sometimes spotted with pink or red. *Spathe valves* 4–13, spreading to erect, varying in texture from membranous to stiff and fleshy, white, pink or red. *Flowers* erect or spreading, actinomorphic, white or shades of pink and red; perianth tube cylindrical to campanulate, 1–12 mm long; segments erect to spreading, oblong to lanceolate, longer than the tube. *Filaments* inserted at throat of perianth tube, filiform, symmetrical, mostly longer than perianth segments or occasionally half as long as segments. *Anthers* oblong, dorsifixed, versatile. *Ovary* subglobose, 3-locular, with a solitary or collateral pair of ovules in each loculus. *Style* filiform, erect, as long as the stamens, minutely trifid at the apex. *Berries* ovoid to globose, becoming soft and pulpy when ripe, white, yellow, pink or red. *Seeds* ovoid, fleshy, wine-red or green. *Chromosome number* $2n = 16$.

Distribution: southern Africa and Namibia, concentrated mostly in Namaqualand.

KEY TO THE SPECIES

(Based mainly on vegetative characters)

1. Bulbs ovoid, near to the surface; tunics more or less equal with horizontally truncate margins; leaves usually present with the flowers; flowers pink or white. Summer rainfall region (with *H. albiflos* extending into the winter rainfall region).
2. Plants deciduous; umbel spreading, broadly obconical to globose; spathe valves soon becoming reflexed.

3. Leaves entirely glabrous, erect.
 4. Spathe valves 5–8, perianth 10–14 mm long 3. **H. montanus**
 - 4'. Spathe valves 4–5, perianth about 20 mm long ... 4. **H. avasmontanus**
- 3'. Leaves mostly with some pubescence, recurved to prostrate.
 5. Stamens equalling the segments or exserted from the perianth at anthesis 1. **H. humilis**
 - 5'. Stamens always included, less than half the length of the perianth segments at anthesis 2 **H. carneus**
- 2'. Plants evergreen; umbel compact, narrowly obovoid to cyathiform; spathe valves remaining erect.
 6. Leaves somewhat flaccid, 25–115 mm wide; peduncle 50–350 mm long, appearing after the current season's leaves; spathe valves standing slightly apart 9. **H. albiflos**
 - 6'. Leaves thick and firm, 70–250 mm wide; peduncle less than 60 mm long, appearing in advance of the current season's leaves; spathe valves overlapping 10. **H. deformis**
- 1'. Bulbs ovoid, globose, pyriform or obclavate, deep seated; tunics unequal, imbricate, in horizontal layers or distichous; leaves appearing after the flowers; flowers red, pink or rarely white. Winter rainfall region.
 7. Leaves solitary, rarely 2; bulbs usually compressed in the median plane; flowers red.
 8. Leaves entirely glabrous, rough and sticky; peduncle somewhat scabrid; spathe valves ovate-lanceolate, markedly acuminate 17. **H. nortieri**
 - 8'. Leaves densely pubescent; peduncle smooth or sparsely pubescent; spathe valves oblong-lanceolate or obovate; not markedly acuminate 20. **H. unifolius**
 - 7'. Leaves 2, rarely 3 or 1; bulbs round to laterally compressed; flowers red, pink or rarely white.
 9. Leaves with undulate or sinuous edges throughout their length or towards the base only; spathe valves erect; flowers red or rarely pink.
 10. Leaves narrowly lorate, 7–33 mm wide, glabrous or covered with short stiff hairs; bulbs round in diam.; spathe valves 4–6, obtrullate to broadly spatulate 5. **H. crispus**
 - 10'. Leaves oblong-lanceolate, 45–110 mm wide, always glabrous; bulbs laterally compressed in diam.; spathe valves 7–8, oblong-lanceolate 8. **H. namaquensis**
 - 9'. Leaves with plane edges; spathe valves erect or spreading; flowers red or pink.
 11. Flowers and spathe valves pink or white.
 12. Leaves with some pubescence, sometimes on the margins only.
 13. Pubescence dense, predominantly on the adaxial surface 21a. **H. pubescens** subsp. **pubescens**
 - 13'. Pubescence sparse, predominantly on the abaxial surface, rarely on both surfaces 6. **H. barkerae**
 - 12'. Leaves entirely glabrous.
 14. Leaves maculate on the abaxial surface.
 15. Leaves adpressed to the ground .. 14. **H. lanceifolius**
 - 15'. Leaves recurved to erect.
 16. Abaxial surface heavily blotched, mostly with dark green shading to red 6. **H. barkerae**

- 16'. Abaxial surface lightly barred with red.
 - 17. Leaves 2,5–15 mm across; fleshy, slightly canaliculate 13. **H. pumilio**
 - 17'. Leaves 5–27 mm across, succulent, deeply canaliculate ... 12. **H. canaliculatus**
- 14'. Leaves immaculate, sometimes flushed with red towards the base.
 - 18. Leaves adpressed to the ground.
 - 19. Leaves succulent; adaxial surface smooth, shiny green 15c. **H. amarylloides** subsp. **toximontanus**
 - 19'. Leaves leathery; adaxial surface sometimes rough with asperities, dull green.
 - 20. Perianth less than 9 mm long 14. **H. lanceifolius**
 - 20'. Perianth greater than 15 mm long 11. **H. sanguineus**
 - 18'. Leaves erect to recurved.
 - 21. Leaves canaliculate towards the base; Tanqua Karoo 7. **H. tristis**
 - 21'. Leaf surfaces plane; Namaqualand.
 - 22. Leaves dull green, stiff; perianth mostly more than 10 mm long 15a. **H. amarylloides** subsp. **amarylloides**
 - 22'. Leaves shiny green, flaccid; perianth mostly less than 10 mm long 15b. **H. amarylloides** subsp. **polyanthus**
- 11'. Flowers and spathe valves red.
 - 23. Leaves with some pubescence, sometimes on the margins only.
 - 24. Leaf surfaces glabrous; only margins pubescent.
 - 25. Leaves oblong-lanceolate, 15–85 mm across; spathe valves 4–6, very acute, mostly exceeding the flowers 21b. **H. pubescens** subsp. **leipoldtii**
 - 25'. Leaves lingulate to elliptic, 25–110 mm across; spathe valves 6–9, blunt or slightly acute, more or less as long as the flowers 18. **H. coccineus**
 - 24. Leaf surfaces pubescent.
 - 26. Pubescence dense, predominantly on the adaxial surface 21a. **H. pubescens** subsp. **pubescens**
 - 26'. Pubescence predominantly on abaxial surface, if equally pubescent on both surfaces then not forming a dense covering.
 - 27. Leaves mostly twisted 19. **H. dasyphyllus**
 - 27'. Leaves never twisted.
 - 28. Leaves lorate, 15–40 mm wide; spathe valves 4–6, very acute, exceeding the flowers 21c. **H. pubescens** subsp. **arenicolus**
 - 28'. Leaves lingulate to elliptic, 25–210 mm wide; spathe valves 6–9, blunt or only slightly acute, more or less as long as the flowers 18. **H. coccineus**

- 23'. Leaves entirely glabrous, if ciliate then cilia cartilaginous.
- 29. Leaves leathery; adaxial surface somewhat rough 11. *H. sanguineus*
- 29'. Leaves fleshy to succulent; adaxial surface smooth.
- 30. Leaves thick and succulent, deeply canaliculate throughout the length 12. *H. canaliculatus*
- 30'. Leaves fleshy but not thick and succulent, sometimes slightly canaliculate towards the base.
- 31. Leaves erect; spathe valves firm but not fleshy 16. *H. graniticus*
- 31'. Leaves recurved; spathe valves fleshy.
- 32. Leaves lingulate to elliptic, 25–210 mm wide; spathe valves 6–9, blunt or only slightly acute, mostly shorter or slightly exceeding the flowers 18 *H. coccineus*
- 32'. Leaves lorate, 15–40 mm wide; spathe valves 4–6, very acute, exceeding the flowers 21c. *H. pubescens* subsp. *arenicolus*

KEY TO THE SPECIES

(Based mainly on floral characters)

- 1. Flowers usually present with the leaves. Summer rainfall region (with *H. albiflos* extending into the winter rainfall region).
- 2. Spathe valves membranous, soon becoming reflexed, pink or rarely white.
- 3. Stamens included in the perianth, less than half the length of the segments at anthesis 2. *H. carneus*
- 3'. Stamens equalling the perianth segments or well exerted at anthesis.
- 4. Flowers white or pink; perianth tube 1–12 mm long; leaves recurved to prostrate, more or less pubescent 1. *H. humilis*
- 4'. Flowers white or pink; perianth tube 1–2 mm long; leaves erect, glabrous.
- 5. Spathe valves 5–8, perianth 10–14 mm long . . 3. *H. montanus*
- 5'. Spathe valves 4–5, perianth about 20 mm long 4. *H. avasmontanus*
- 2'. Spathe valves firm, erect, white, usually with green veining.
- 6. Peduncle 50–350 mm long; spathe valves standing slightly apart; inflorescence appearing after the current season's leaves . . 9. *H. albiflos*
- 6'. Peduncle less than 60 mm long; spathe valves closely overlapping; inflorescence appearing in advance of the current season's leaves 10. *H. deformis*
- 1'. Flowers appearing without the leaves. Winter rainfall region.
- 7. Perianth very short, 6–12 mm long; spathe valves pink, widely spreading.
- 8. Umbel hemispherical; spathe valves mostly 6–9, rarely 5.
- 9. Flowers 20–65, white to pale pink; leaves adpressed to the ground, leathery 14. *H. lanceifolius*
- 9'. Flowers 50–115; pale pink to rose; leaves erect, fleshy 15b. *H. amarylloides* subsp. *polyanthus*

- 8'. Umbel obconical; spathe valves 4–6.
- 10. Leaves with red or green markings on the abaxial surface.
 - 11. Leaves usually twisted; bulbs laterally compressed 13. **H. pumilio**
 - 11'. Leaves never twisted; bulbs mostly round in cross section 6. **H. barkerae**
- 10'. Leaves immaculate with only a pink blush towards the base.
 - 12. Spathe valves without dark mottling; leaves very fleshy ... 7. **H. tristis**
 - 12'. Spathe valves becoming darkly mottled; leaves stiff in texture 15a. **H. amarylloides** subsp. **amarylloides**
- 7'. Perianth longer than 12 mm, sometimes as long as 32 mm; spathe valves pink or red, erect or spreading.
- 13. Spathe valves pink.
 - 14. Spathe valves distinctly broadest above the middle, erect.
 - 15. Spathe valves obtrullate to broadly spatulate, stiff; Namaqualand 5. **H. crispus**
 - 15'. Spathe valves obovate to spatulate, thick and fleshy; sandy flats of the western coast 21. **H. pubescens**
 - 14'. Spathe valves broadest at or below the middle, erect or spreading.
 - 16. Perianth segments 3–4,5 mm broad; marshy areas of the south western Cape coast 12. **H. canaliculatus**
 - 16'. Perianth segments less than 3 mm wide.
 - 17. Umbel compressed in the median plane; spathe valves mostly 6–9, occasionally 5 or 10; lateral spathe valves keeled 11. **H. sanguineus**
 - 17'. Umbel obconical, uniformly spreading; spathe valves 4–6; lateral spathe valves mostly straight.
 - 18. Leaves heavily marked with dark green and red on the abaxial surface 6. **H. barkerae**
 - 18'. Leaves immaculate, sometimes flushed with pink near the base 15. **H. amarylloides**
 - 13'. Spathe valves red.
 - 19. Spathe valves stiff, thick and fleshy, erect and closely overlapping.
 - 20. Spathe valves 6–9, rarely as few as 4, shorter or slightly longer than the flowers; widespread 18. **H. coccineus**
 - 20'. Spathe valves 4–6, rarely 7, mostly longer than the flowers; sandy flats of the western coast 21. **H. pubescens**
 - 19'. Spathe valves firm not thick, erect to slightly spreading, only slightly overlapping or overlapping near the base only.
 - 21. Spathe valves distinctly broadest above the middle, obtrullate to broadly spatulate 5. **H. crispus**
 - 21'. Spathe valves broadest at or below the middle, oblong, lanceolate or elliptic.
 - 22. Spathe valves acuminate; peduncle somewhat scabrid 17. **H. nortieri**
 - 22'. Spathe valves blunt or slightly acute; peduncle smooth or softly pubescent.
 - 23. South western and southern Cape species (south of the Olifants River).

- 24. Leaves narrowly ligulate, 5–30 mm wide, thick and succulent; deeply canaliculate 12. *H. canaliculatus*
- 24'. Leaves oblong to lingulate or elliptic, usually more than 30 mm wide, leathery or fleshy but not succulent.
- 25. Peduncles usually compressed and furrowed; leaves rough and immaculate 11. *H. sanguineus*
- 25'. Peduncles round or somewhat compressed but not furrowed; leaves smooth and mostly barred with red 18. *H. coccineus*
- 23'. Namaqualand and western Karoo species (north of the Olifants River).
- 26. Peduncles softly pubescent or glabrous; leaves always pubescent.
- 27. Leaves 2, with a covering of long soft hairs; bulb tunics distichous 19. *H. dasyphyllus*
- 27'. Leaves 1, rarely 2, densely pubescent with short patent hairs; bulb tunics in horizontal layers 20. *H. unifolius*
- 26'. Peduncles always glabrous; leaves always glabrous.
- 28. Leaves oblong-lanceolate, sinuate; bulb large and fleshy, without a paper covering 8. *H. namaquensis*
- 28'. Leaves lanceolate, plane; bulb well covered with dark brown papery layers 16. *H. graniticus*

1. *Haemanthus humilis* Jacq., Hort. Schoenbr. 4: 6 t. 411 (1804); Baker, Handb. Amaryllid. : 71 (1888) and in Flora Cap. 6: 239 (1896). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 4: t. 411 (1804) (lectotype, here designated).

Melicho humilis (Jacq.) Salisb. ex Baker, Handb. Amaryllid.: 71 (1888) in synonymy only, combination not made by Salisbury. (See subspecies for further synonymy.)

Bulb solitary or in clumps, varying from small to large, mostly ovoid, medianly compressed to more or less round in cross section, up to 80 mm across; tunics more or less equal with horizontally truncate margins, cream-coloured, sometimes turning dark pink when exposed to light, occasionally with a withered brown outer covering. *Leaves* 2, rarely 3, prostrate, recurved or suberect, appearing with the inflorescence or shortly after; blade narrowly to broadly elliptic, lanceolate or oblong, 20–300 mm long, 13–150 mm wide at the middle, flat or slightly channelled at the base, immaculate, mostly with some pubescence on one or other surface, rarely entirely

glabrous; adaxial surface dark or light green, sometimes strigose or papillate; abaxial surface light green; margin ciliate; apex acute or obtuse. *Peduncle* erect or bent sideways, 20–300 mm long, 4–16 mm across widest diam., varying from pale green to pink or deep maroon, immaculate, usually more or less pubescent, only rarely glabrous. *Umbel* loose or dense, broadly obconical to hemispherical, 25–120 mm across. *Spathe valves* (4–)5–10, spreading and soon becoming reflexed, shorter than the flowers, broadly to narrowly triangular or lanceolate (11–)15–30 mm long, 2–15 mm broad, pale to dark pink, membranous; margins sometimes ciliate; tips acute. *Flowers* 15–120, pale pink to rose-pink, or white and fading to pink. *Pedicels* 5–30 mm long, green, sometimes flushed with pink. *Perianth* 7–25 mm long; tube 1–10 (–12) mm long, cylindrical; segments slightly spreading, narrowly lanceolate, 4–21 mm long, 1–2 mm wide; tips acute. *Filaments* either equalling the segments or exserted by as much as 15 mm, pink or white. *Anthers* 1 mm long when open, yellow. *Ovary* subglobose, about 2 mm diam., green, sometimes with a pink blush. *Style* more or less as long as the filaments. *Berries* ovoid, 5–10 mm diam., greenish-white to cream or orange, pulpy with a fruity smell when ripe. *Seeds* ovoid, about 5 mm diam., white.

Flowering time: mostly from November to February but sometimes extending from as early as September until March.

Leafing period: leaves appear with the inflorescence or shortly after and last until midwinter or sometimes as late as November.

Distribution and habitat: widespread throughout the inland summer rainfall regions of southern Africa, only nearing the coast around Grahamstown and King William's Town, in the eastern Cape. Populations are usually small, found mostly on southern slopes amongst rock outcrops (Fig. 10).

Haemanthus humilis is a distinct but highly polymorphic species represented by many small, more or less continuously varying populations. Vegetatively, the species can be distinguished by its round or medianly compressed bulbs, with more or less even tunics and its flaccid, immaculate leaves which range from being densely pubescent to almost glabrous. The spathe valves surrounding the umbel are soft and membranous and soon become reflexed. Thus the umbel is dominated by the white or deep pink flowers in which the stamens are either well exserted or equal in length to the perianth segments. The inflorescence is mostly present with the leaves or may sometimes appear slightly in advance of them.

In past literature, *H. humilis* has always been listed as poorly known. Baker (1888, 1896) was never able to refer any herbarium material to *H. humilis* and neither could Friis & Nordal (1976). It was only with some doubt that the latter authors referred *H. humilis* to their *H. carneus* complex.

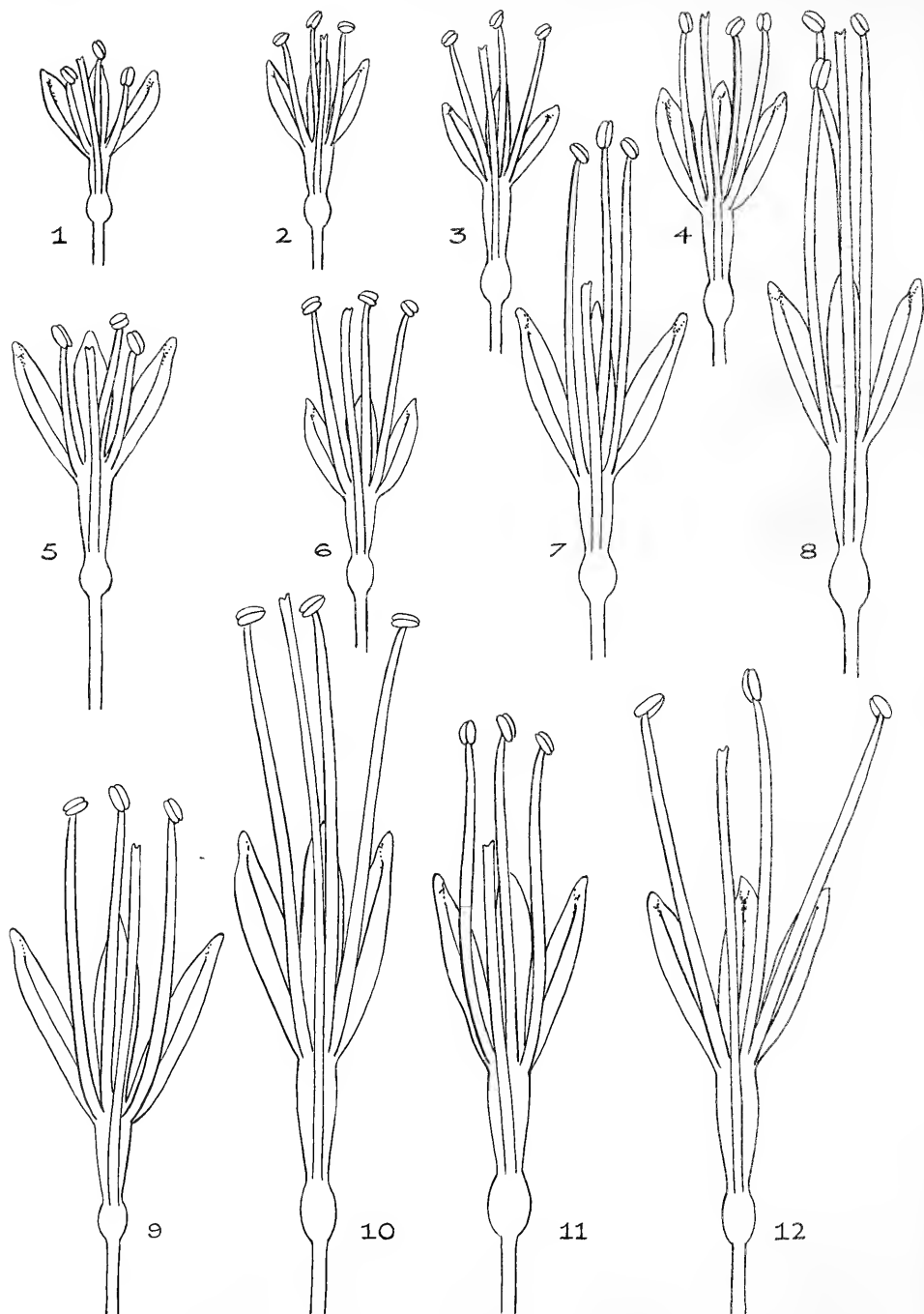


FIG. 8.

Half flowers of *H. humilis* ($\times 2$), illustrating the range in perianth size. 1–6 subsp. *humilis*; 7–12 subsp. *hirsutus*. (1 Bokelmann s.n.; 2 Bayliss 1244; 3 NBG 233/53 4 Roux & McMaster 28; 5 Hiemstra 517; 6 Snijman 247; 7 NBG 1350/49; 8 van Jaarsveld 1834; 9 Scott s.n.; 10 NBG 449/37; 11 NBG 161/50; 12 NBG 95006).

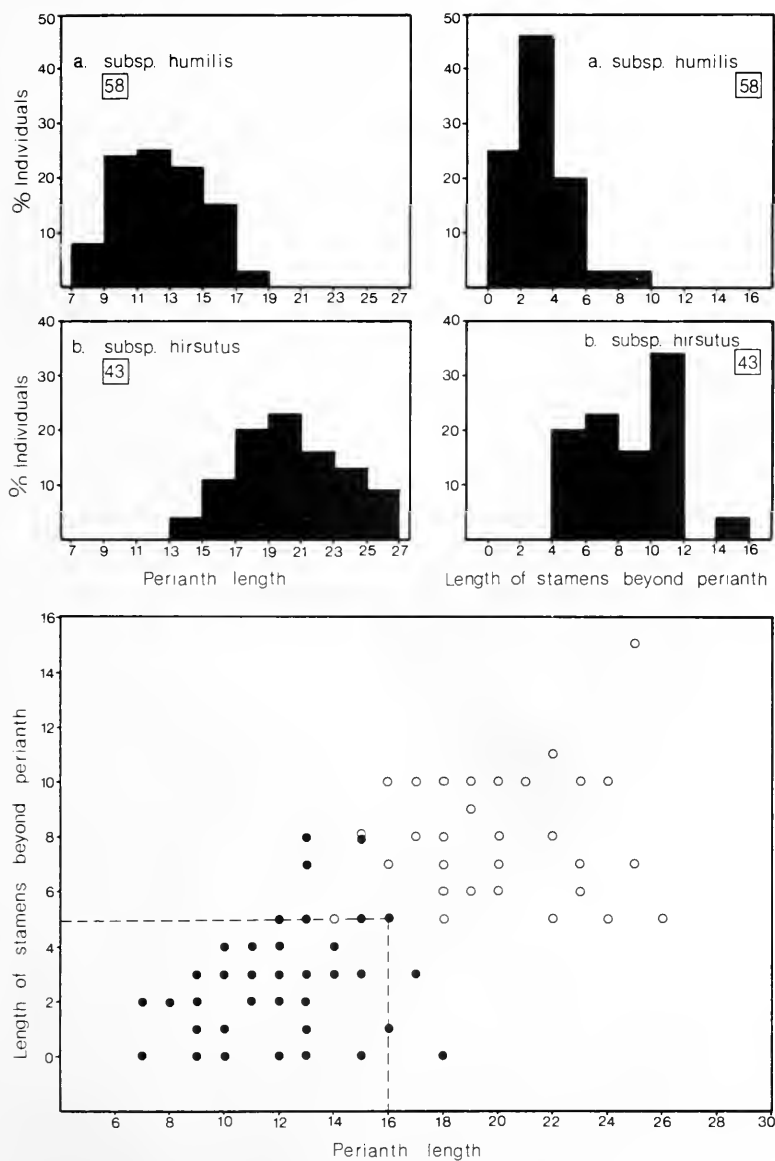


FIG. 9.
Histograms and scatter diagram illustrating the range in perianth and stamen length in *H. humilis* subsp. *humilis* (●) and *H. humilis* subsp. *hirsutus* (○). The number enclosed in a square in each histogram is the total of individuals measured.

A comparison of all specimens gathered within the area explored by Jacquin's collectors Boos & Scholl, namely Namaqualand, eastward to the Komgha-King William's Town district (Gunn & Codd, 1981), showed that collections from the eastern Cape, referred to previously in South African herbaria as *H. brevifolius*, *H. carneus* var. *strigosus* and more recently as *H. carneus* sensu Friis & Nordal, correspond most closely with Jacquin's description of *H. humilis*. The specimens, Martin sub NBG 452/38 (NBG), collected along the Kei River, are particularly like Jacquin's plate. The leaves are approximately the same shape and dimensions as those described by Jacquin; both surfaces are glabrous and only the margins are pubescent. The inflorescences of Martin's gatherings show various stages of development, some have spathe valves still erect, as shown in Jacquin's plate, while others are widely spread. The flowers are pale pink but observations on living material from the same site (*Hiemstra 517*, NBG) show that flowers are initially white and only later turn pink when fully mature. The name *H. humilis* takes precedence over all other names within Friis & Nordal's *H. carneus* complex, thus excluding *H. carneus* sensu stricto, they are placed here into synonymy with *H. humilis*.

Haemanthus carneus sensu stricto is excluded from *H. humilis* for the following reasons. In the original description, Ker Gawler (1821) mentions that *H. carneus* has filaments which are included within the perianth and are only half as long as the segments at anthesis. This distinctive and somewhat unique character is evident in several collections (from near Somerset East and Grahamstown in the eastern Cape, as well as from Fauresmith in the Orange Free State and near Estcourt in Natal) and since no intermediates have yet been recorded between *H. carneus* and *H. humilis*, it is treated here as a separate species.

Analysis of the variation amongst specimens included within *H. humilis* shows the existence of distinct dimorphism in their floral parts (Figs 8 and 9). Specimens from the low, fairly arid westerly areas of the Transvaal and Orange Free State, as well as the Great Karoo and eastern Cape, have short perianths (mostly 7–16 mm long) and stamens which are either equal to the perianth segments or shortly exserted (mostly up to 5 mm) beyond the segments. In contrast, specimens from the Transvaal highveld, the eastern Transvaal escarpment and Natal midlands, have longer flowers (usually 16–26 mm long) and stamens which are prominently exserted (5–15 mm longer than the perianth). Despite some overlap, particularly in the Transvaal, the differences between specimens from the western areas of the summer rainfall region and those from the eastern areas are considered sufficiently distinct to constitute the recognition of two subspecies.

KEY TO THE SUBSPECIES

- a. Umbel loose, hemispherical; spathe valves 4–7(–10); flowers rose-pink to white; perianth 7–16(–18) mm long, tube 1–6(–7) mm long, segments 4–10(–14) mm long; stamens equalling the perianth segments or exserted by up to 5(–8) mm; flowering mostly from late January to February; western Transvaal, Orange Free State, northern and eastern Cape subsp. **humilis**
- b. Umbel stiff, widely obconical to hemispherical; spathe valves 7–10; flowers pale pink to white; perianth (15–)16–26 mm long, tube 5–12 mm long; segments 10–21 mm long; stamens exserted by 5–15 mm; flowering mostly between November and December; eastern Transvaal, Transvaal highveld, Swaziland, Lesotho and Natal subsp. **hirsutus**

a. subspecies **humilis**. Plates 1 and 2.

Haemanthus brevifolius Herbert, Amaryllid.: 234 t. 30 fig. 3 (1837). Type: South Africa, cultivated at Kew 1800, the sheet at the British Museum is without the collector's name (BM, holotype).

H. strigosus Herbert, Amaryllid.: 234 t. 30 fig. 2 (1837). Type: South Africa, Masson *s.n.* (BM, holotype).

H. carneus Ker Gawler var. *strigosus* (Herbert) Baker, Handb. Amaryllid.: 67 (1888).

H. arnotii Baker in Gard. Chron. N. Ser. 10: 492 (1878), as *H. arnotii*. Type: South Africa, Colesberg, Arnot *s.n.*, hort. Kew 4/9/1879 (K, designated here as lectotype).

H. ryderae Barnes MS. Several sheets so annotated in BOL, K, NBG and PRE.

H. ryderae Barnes var. *glaber* Barnes MS. 7 to 8 miles from Grahams-town on Peddie road, Dyer 2362 (BOL).

Icones: Hook. f. in Bot. Mag. 21: t. 5532 (1865) as *H. incarnatus*; Phillips in Fl. Pl. S. Afr. 18: pl. 695 (1938) as *H. nelsonii*.

Leaves prostrate or recurved, appearing with or shortly after the inflorescence; blade 20–240 mm long, 13–150 mm wide at the middle, flat; adaxial surface dark or light green, smooth or hairy, the hairs sometimes coarse with papillose bases; abaxial surface light green, glabrous or rarely pubescent. *Peduncle* 20–300 mm long, 4–9 mm across greatest diam. *Umbel* loose, hemispherical, 25–60(–100) mm across. *Spathe valves* (4–)5–7, broadly to narrowly triangular (11–)15–25(–30) mm long, 2–9 mm broad. *Flowers* 15–80, rose-pink to white and fading to pink. *Perianth* 7–16(–18) mm long; tube 1–6(–7) mm long; segments (4–)5–10(–14) mm long. *Filaments* equaling the segments or exserted by up to 5(–8) mm.

Flowering time: January to March with the peak between late January and February.

Distribution and habitat: widespread in the karroid regions, the eastern and northern Cape, the Orange Free State and western Transvaal at altitudes ranging mostly from 460 to 1 400 m above sea level (Fig. 10).

The following noteworthy trends are evident within *H. humilis* subsp. *humilis*. Populations from the western Transvaal, Orange Free State and the wetter areas of the eastern Cape tend to have the leaves present at flowering time and inflorescences which are generally more robust than elsewhere. In contrast, populations from further west, in the northern Cape, Karoo and the Grahamstown–King William's Town area, have smaller inflorescences which usually precede the leaves. Bulbs from the extreme southerly areas are sometimes very small with peduncles occasionally reaching only 30 mm high and leaves as small as 20 mm long by 7 mm wide. The extreme dwarf forms recorded from Grahamstown, King William's Town, Graaff-Reinet and Nelspoort have often been referred to in the past as *H. brevifolius*.

A further pattern within *H. humilis* subsp. *humilis*, is for specimens from Grahamstown, King William's Town and the Transkei to have stamens which barely exceed the perianth. This is found also in some specimens from the Rustenburg area of the Transvaal, whereas those from the Orange Free State and Karoo have well-exserted stamens (Fig. 8).

TRANSVAAL—2427 (Thabazimbi): Matlabas (-AD), *van Jaarsveld* 3329 (K, MO, NBG, PRE, S); Krantzberg (-BC), *Dyer & Verdoorn* 4226 (K, PRE).

—2428 (Nylstroom): Near Warmbaths (-CD), *Repton* 808 (PRE), *Codd* 4822 (PRE).

—2527 (Rustenburg): Maricana (-CB), *Pole Evans* 3919 (PRE); Breedts Nek (-CD), *Dyer & Verdoorn* 3921 (PRE); Jacksontuin (-DA), *van Vuuren* 454 (K, PRE); Farm Krokodildrift near Brits (-DB), *Obermeyer* in herb. Tvl. 35147 (PRE); Hennops River (-DD), *Prosser* 1594 (PRE).

—2528 (Pretoria): Pretoria (-CA), *Munro* 13782 (PRE); Pretoria University farm, *Codd* 5913 (PRE); 20 miles east of East Lynn (-CD), *Wisura* 1216 (NBG); Magaliesberge (-DC), *Dahlstrand* 1910 (PRE), *Fouche s.n.* (PRE).

—2529 (Witbank): Doornkop, Middelburg (-CB), *du Plessis* 222 (PRE).

—2627 (Potchefstroom): Boskop (-CA), *Louw* 702 (PRE).

—2725 (Bloemhof): Wolmaransstad (-BB), *Liebenberg* 3434 (PRE).

ORANGE FREE STATE—2825 (Boshof): Kareepan, Barkly West Division (-CB), *Snyman s.n.* (BOL).

—2826 (Brandfort): Tabaksberg summit (-DB), *van Jaarsveld* 1782 (NBG).

—2827 (Senekal): Willem Pretorius Wildtuin (-AC), *Müller* 858 (PRE); 4 miles west of Winburg (-CA), *Codd* 6359 (PRE).

—2925 (Jagersfontein): Fauresmith (-CB), *Henrici* 1955 (PRE).

—2926 (Bloemfontein): Winter valley, north of Bloemfontein (-AA), *Müller* 150 (PRE); Bloemfontein, *OFS* 32/68 (NBG); Thabanchu (-BB), *Roberts* 2980 (PRE).

CAPE—2722 (Olifantshoek): Top of Verwatersnek, Postmasberg (-BC), *Leistner* 1604 (K, PRE).

—2820 (Kakamas): Tierberg, Keimoes Nature Reserve (-DB), *Snijman* 247 (NBG); Kakamas (-DC), *Fuller* 150 (PRE).

PLATE 1.

H. humilis Jacq. subsp. *humilis* (*Batten* 591, near King William's Town) 1 flower \times 2; 2 spathe valve \times 2; 3 section of flower \times 3; 4 inflorescence \times 1; 5 bulb and inflorescence \times 1; 6 mature leaves \times 1; 7 young leaves \times 1.



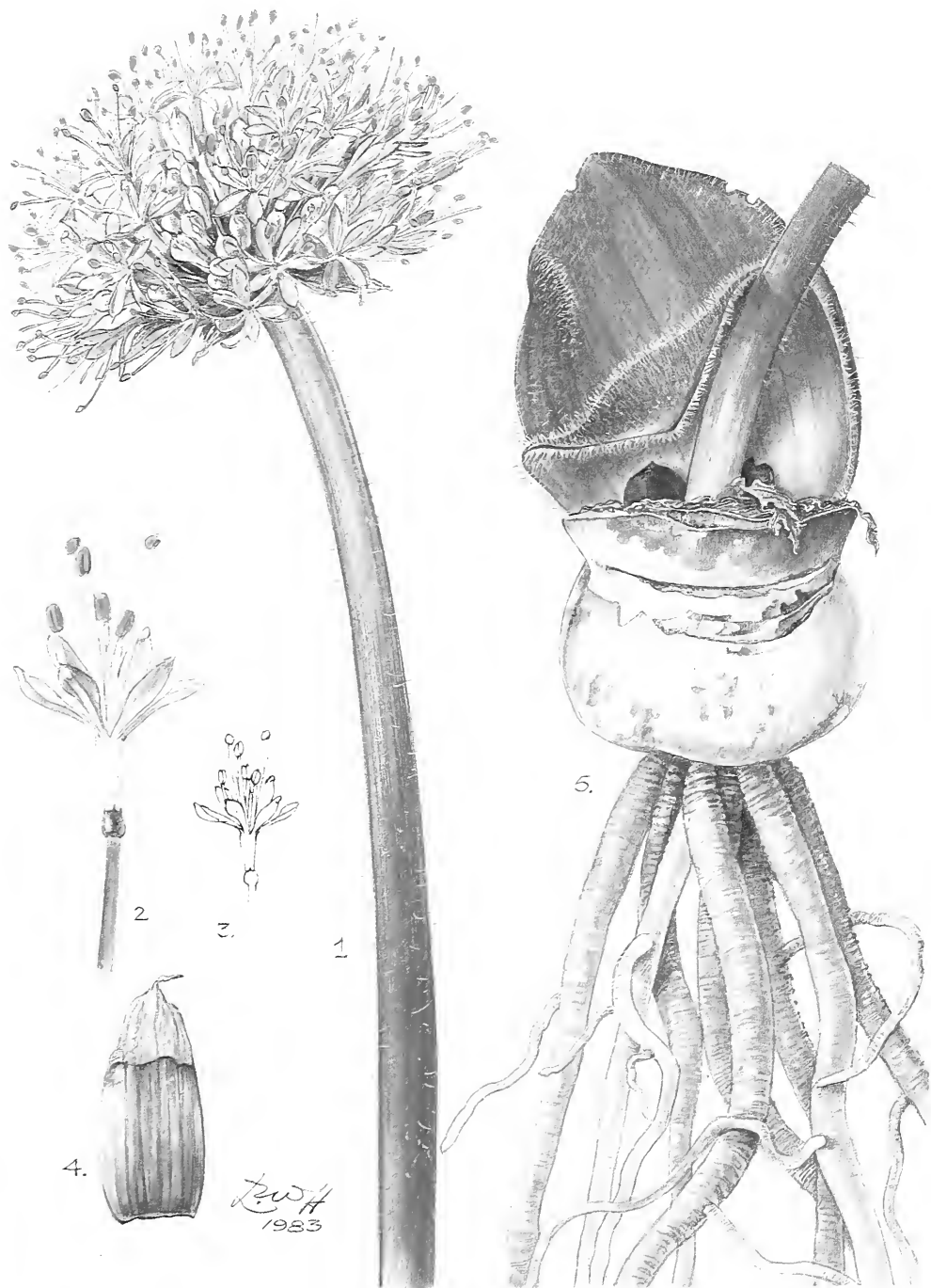
Levenh. H.
1885

HAEMANTHUS HUMILIS JACQ. SUBSP. HUMILIS

- 2823 (Griekwastad): Asbestos Mountains (-CB), *Marloth s.n.* (PRE); Herbert (-DC), *Stayner s.n.* (NBG); Near Campbell, Herbert Division, *Reynolds s.n.* (K, PRE).
- 2824 (Kimberley): Koppies near Kimberley (-DB), *Power* (BOL 16542); 20 miles south of Kimberley (-DC), *Hall* sub NBG 233/53 (NBG).
- 2922 (Prieska): Orange River Crossing, Prieska (-DA), *Stayner s.n.* (NBG); Prieska, *Bryant s.n.* (K, PRE).
- 3024 (De Aar): Farm Klipkraal about 40 km west of Colesberg (-DD), *Murray s.n.* (PRE).
- 3025 (Colesberg): Colesberg (-CA), *Arnot s.n.* (K).
- 3026 (Aliwal North): 12 myl oos van Bethuli in richting van Aliwal North (-AC), *Werger 189* (K, PRE); Elandshoek near Aliwal North (-DC), *Bolus* in herb. Austro-Africanæ 226 (BOL).
- 3027 (Lady Grey): Gatberg (-AD), *Baur 1169* (K).
- 3123 (Victoria West): Murraysberg (-DD), *Tyson 463* (GRA), *Tyson s.n.* (BOL).
- 3124 (Hanover): Aasvoëlkrantz near New Bethesda (-CD), *Bayer 2355* (NBG); Farm Wilgerbos, Compassberg (-DC), *Roux & McMaster 28* (NBG).
- 3125 (Steynsburg): Middelburg (-AC), *Theron 703* (PRE).
- 3126 (Queenstown): Stormberg near Patriots Klip (-AD), *Wood* in herb. Galpin 2319 (BOL, PRE).
- 3127 (Lady Frere): Cala Pass (-BC), *Reynolds 1742* (PRE); Near Engcobo (-DB), *Bolus* in herb. Austr. Afr. 10328 (BOL, SAM), *Flanagan 2761* (PRE).
- 3128 (Umtata): Maclear (-AB), *Martin* sub NBG 451/38 (NBG); Umtata (-DB), *Pegler 2137* (PRE).
- 3223 (Rietbron): Nelspoort, Beaufort West (-AA), *Haynes* sub NBG 46/26 (BOL), *Pearson 1132* (NBG).
- 3224 (Graaff-Reinet): Graaff-Reinet (-BC), *Bolus s.n.* (BOL), *Bolus 764* (K), *Bowker 33* (K), *Bayer 2349* (NBG).
- 3225 (Somerset East): Cradock (-BA), *Brynard 175* (PRE).
- 3226 (Fort Beaufort): 35 miles from Grahamstown on Fort Beaufort road (-DC), *Dyer 2290* (BOL, K, PRE).
- 3227 (Stutterheim): Stutterheim (-CB), *Myers* sub NBG 170/29 (BOL); Near King William's Town (-CD), *Brownlee* sub *Marloth 11856* (PRE), *Bokelmann s.n.* (K, NBG, PRE), *Batten 591* (K, NBG); Along the Kei River near Komgha (-DB), *Flanagan 2251* (PRE); Kei Cutting, *Martin* sub NBG 452/38 (NBG); Banks of Kei River, *Hiemstra 517* (NBG, PRE).
- 3325 (Port Elizabeth): Kommadagga (-BB), *Bayliss 1244* (NBG), *Bayliss s.n.* (NBG).
- 3326 (Grahamstown): Farm Wilgerfontein, between Kommadagga and Alicedale (-AC), *Snijman 471* (NBG); Grahamstown (-BC), *Black 19* (BOL, PRE), *Guthrie s.n.* (BOL), *Bolton s.n.* (K); 7 to 8 miles from Grahamstown on Peddie road, *Dyer 2362* (BOL).
- 3425 (Skoenmakerskop): Sea View (-AB), *Long 142* (GRA, K).
- Inexact localities: Caledon river, Orange Free State, *Burke 444* (K, SAM); Rhinosterkop, Orange Free State, *Burke s.n.* (K); Stinkfontein, Kalahari region, *Ryder* sub NBG -/28 (BOL); Florasfontein, Herbert, *Anderson 719* (SAM); Doctors Drift, Aliwal North region, *Gerstner 332* (K, PRE); South Africa, *Masson* in herb. Banks (BM); Between Grahamstown and Fort Beaufort, *Ryder 95* (BOL).

PLATE 2.

H. humilis Jacq. subsp. *humilis* (OFS 32/68, Bloemfontein) 1 inflorescence \times 1;
2 flower \times 2; 3 flower \times 1; 4 spathe valve \times 2; 5 bulb and young leaves \times 1.



HAEMANTHUS HUMILIS JACQ. SUBSP. HUMILIS

b. subspecies ***hirsutus*** (Baker) Snijman, stat. nov. **Plate 3.**

Haemanthus hirsutus Baker in Gard. Chron. N.S. **9** (1): 756 (1878); Handb. Amaryllid.: 70 (1888) and in Flora Cap. **6**: 237 (1896). Type: South Africa, Natal, near Mooi River, 19/12/1885, *Wood 3443* (K, neotype).

H. candidus Bull, Cat. New Plants: 3 (1894), as *H. candidum*. Type: South Africa, Transvaal, probably not preserved.

H. nelsonii Baker in Kew Bull. **143**: 310 (1898). Type: South Africa, Transvaal, Johannesburg, *W. Nelson* sub *Leichtlin s.n.*, Nov. 1897 (K, designated here as lectotype).

Leaves recurved to suberect, appearing with the inflorescence; blade 150–300 mm long, 55–130 mm wide; both surfaces light green, pubescent or glabrous but usually the adaxial surface glabrous and the abaxial surface pubescent. *Peduncle* 150–300 mm long, 10–16 mm across. *Umbel* stiff, broadly obconical to hemispherical, 50–120 mm across. *Spathe valves* 7–10, broadly to narrowly triangular or lanceolate, 20–30 mm long, 3–15 mm broad. *Flowers* 25–120, pale pink or white, fading to pink. *Perianth* 15–25 mm long; tube (4–)5–12 mm long; segments 10–17(–21) mm long. *Filaments* exerted by 5–15 mm.

Flowering time: September to February with the peak between November and December.

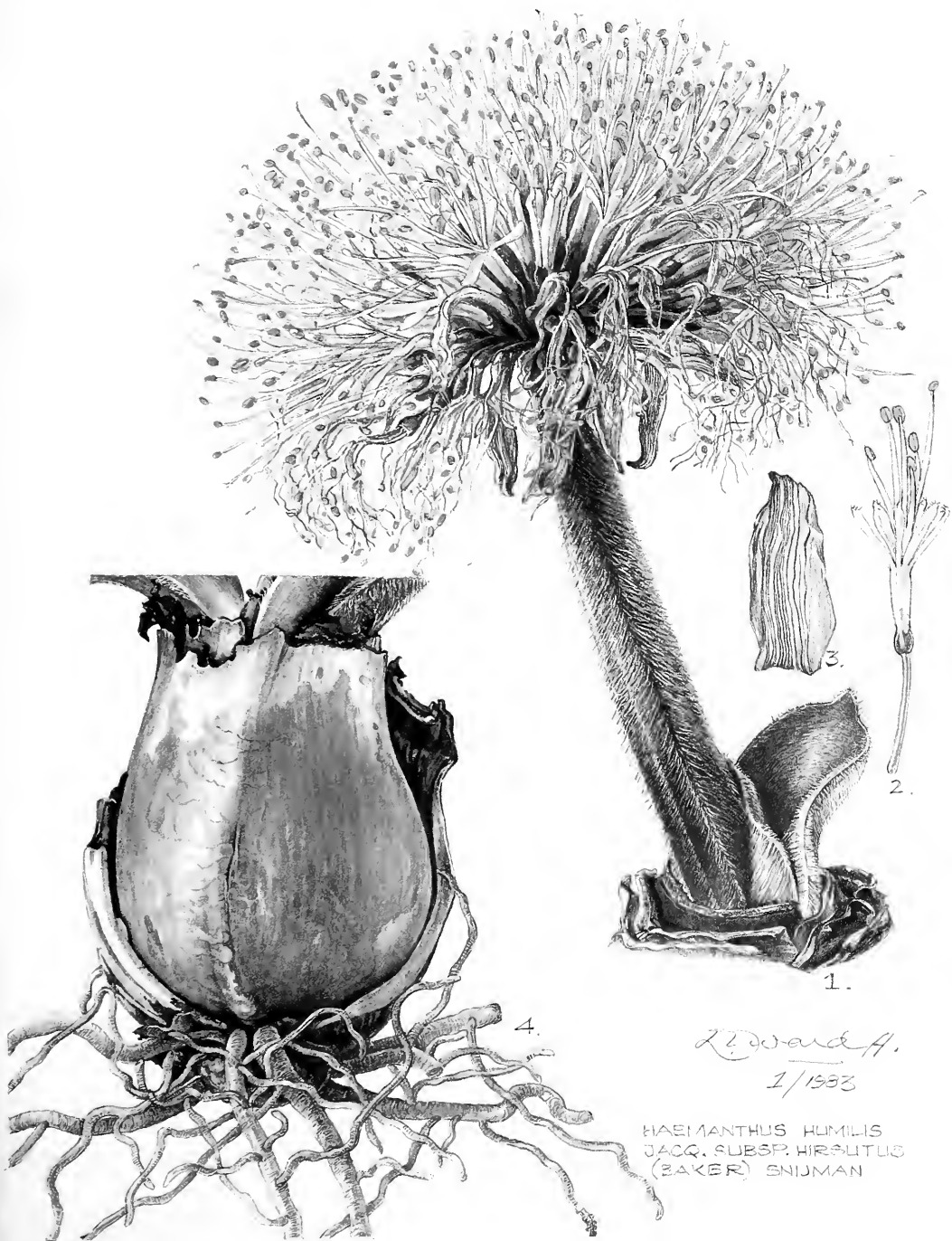
Distribution and habitat: widespread on the Transvaal highveld, the eastern Transvaal escarpment, Swaziland, Lesotho and the Natal midlands at altitudes ranging from 1 220 to 2 100 m above sea level (Fig. 10).

Haemanthus humilis subsp. *hirsutus* is one of the most attractive taxa in the genus. The soft green leaves appear at the same time as the inflorescence and are usually well-developed when the flowers open. The pale pink or white umbels are large and dense, usually dominated by well-exserted stamens (5–15 mm). Unlike *H. humilis* subsp. *humilis*, this subspecies is fairly uniform. No broad pattern of variability is evident but considerable differences can be found amongst individuals within a single population as regards the hairiness of the leaves. The leaves may be completely glabrous with only ciliate margins, entirely pubescent or with pubescence on the abaxial surface only.

Haemanthus hirsutus was first described by Baker in 1878 from a plant sent from the Transvaal by Mr. C. Mudd, to the nurserymen, Messrs. Veitch & Sons in Chelsea, England, where it flowered. The specimen was

PLATE 3.

H. humilis Jacq. subsp. *hirsutus* (Baker) Snijman (*van Jaarsveld 1834*, north west of Johannesburg) 1 inflorescence and young leaves $\times 1$; 2 flower $\times 1$; 3 spathe valve $\times 1$; 4 bulb $\times 1$.



Edward A.
1/1933

HAEMANTHUS HUMILIS
JACQ. SUBSP. *HIRSAUTUS*
(BAKER) SNIJMAN

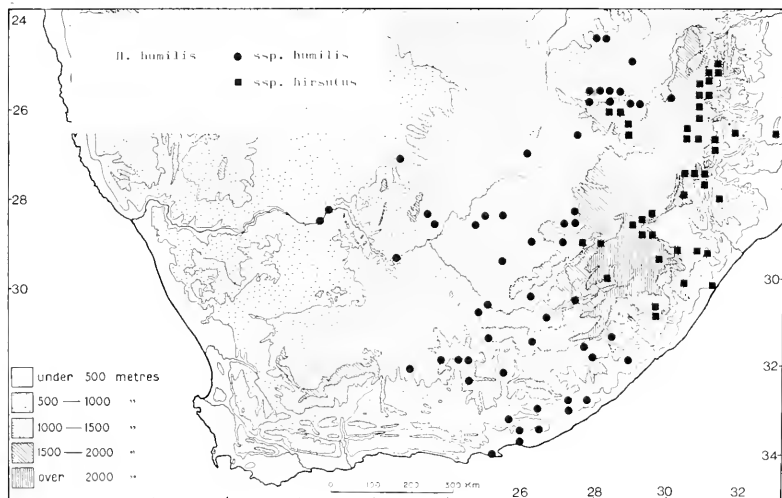


FIG. 10.
Distribution of *H. humilis* Jacq.

never preserved. A neotype has therefore been selected from the specimens cited in Baker's *Handbook of Amaryllideae* (1888), namely *Wood 3443* (K), from near Mooi River, Natal which accords well with the original description.

The type of *H. nelsonii* falls well within the limits of *H. humilis* subsp. *hirsutus*; hence the name is placed into synonymy with this subspecies. However, as the name has been rather loosely applied in the past, many specimens bearing the name *H. nelsonii* sensu lat., have been cited here under *H. humilis* subsp. *humilis*.

TRANSVAAL—2430 (Pilgrims Rest): Morgenzon Nature Reserve (-DC), *Kluge 2111* (PRE).

—2530 (Lydenburg): Farm Kwagershoek near Lydenburg (-AB), *Obermeyer* in herb. Tvl. Mus. 28073 (PRE); Between Lydenburg and Schoemanskloof (-AB/-AD), *van Balen s.n.* (PRE); 5 miles north of Dullstroom (-AC), *Reynolds 5772* (PRE); Between Belfast and Dullstroom, *Harding 7* (PRE); Mount Anderson (-BA), *Smuts & Gillett 2440* (PRE); Belfast (-CA), *Strey 3208* (PRE), *Williams s.n.* (K, MO, PRE); Machadodorp (-CB), *Galpin 12961* (PRE); 1 mile east of Sewefontein (-CC), *Codd 8089* (BM, K, PRE).

—2531 (Komatipoort): *Thorncroft* in Nat. Herb. 15228 (PRE).

—2627 (Potchefstroom): Constantia Kruijn hills near Roodepoort (-BB), *Roux 335* (NBG); North west of Johannesburg, *van Jaarsveld 1834* (NBG).

—2628 (Johannesburg): Bryanston (-AA), *Gilliland J35050* (PRE); Johannesburg,

Nelson sub *Leichtlin* s.n. (K); Heidelberg (-AD), *Plowes* 3173 (PRE); Suikerbosrand (-CB), *Bredenkamp* 506 (PRE).

—2629 (Bethal): Breyton (-BD), *Steyn* sub NBG 1350/49 (NBG); Spitskop, Ermelo, *Pott* 5256 (PRE); Ermelo (-DB), *Steyn* 841 (NBG), *Collins* s.n. (PRE), *Swart* s.n. (PRE), *Scholars* 183 (PRE), *Burt* *Davy* 2191 (PRE); Nootgedacht, *Potter* 1470 (PRE).

—2630 (Carolina): Near Carolina (-AA), *Bolus* 12367 (BOL, K); Mavariestad (-CA), *Pott* 5169 (PRE); Amsterdam (-DA), *van der Merwe* 1058 (PRE); Iswepi (-DC), *Sidey* s.n. (K, PRE).

—2729 (Volksrust): Volksrust (-BD), *Jenkins* in herb. Tvl. Mus. 10038 (PRE).

—2730 (Vryheid): Wakkerstroom (-AC), *Roberts* in herb. Tvl. Mus. 12772 (PRE).

ORANGE FREE STATE—2828 (Bethlehem): Golden Gate National Park (-DA), *Liebenberg* 7313 (K, PRE); Near Elandsriver at foot of Mont-aux-Sources (-BD-DB), *Flanagan* 1830 (BOL).

—2829 (Harrismith): Harrismith (-AC), *Sankey* 307 (K).

—2927 (Maseru): Farm Sgravenhage, Modderpoort (-AB), *Fawkes* sub NBG 449/37 (NBG).

SWAZILAND—2631 (Mbabane): Dalriach (-AC), *Compton* 28571 (NBG); Ukutula, *Compton* 28479 (NBG).

—2632 (Bela Vista): Farm Mlawula, Lebombo mountains (-AC), *Culverwell* 559 (PRE).

NATAL—2729 (Volksrust): Farm Union, Newcastle (-DD), *Guy & Ward* 1 (PRE).

—2730 (Vryheid): Oshoek (-AD), *Devenish* 220 (PRE); Utrecht (-CB), *van der Merwe* 11 (PRE); Vryheid (-DD), *Galpin* 10036 (PRE).

—2828 (Bethlehem): Mont-aux-Sources (-DD), *Schweickerdt* 792 (PRE).

—2829 (Harrismith): Cathedral Peak (-CC), *Killick* 1161 (K, PRE).

—2830 (Dundee): Draycott Hill, Weenen (-CC), *Acocals* 10778 (PRE); Jameson Drift (-DD), *Strey* 9312 (K, PRE).

—2929 (Underberg): Giants Castle (-AD), *Symons* 113 (PRE), *Trauseld* 709 (PRE); Farm Farleigh, Estcourt (-BB), *Plowes* 2385 (PRE); Estcourt, *Werdermann & Oberdieck* 1228 (PRE); 10 miles south east of Estcourt, *Dyer* 4863 (PRE).

—2930 (Pietermaritzburg): Greenwich farm, Rietvlei (-AB), *Fry* in herb. Galpin 2708 (PRE); Greytown (-BA), *Handley* sub NBG 161/50 (MO, NBG, PRE), *Ledeboer* s.n. (K, PRE).

—3029 (Kokstad): Beyond Kokstad near Mt. Currie (-AD/-CB), *Hutchinson* 1812 (BOL, K, PRE); Kokstad (-CB), *Sister Mildred* 70 (NBG); Near Kokstad, *Tyson* 1673 (BOL, SAM); Farm Westlands, Kokstad, *Scott* s.n. (NBG).

LESOTHO—2828 (Bethlehem): Leribe (-CC), *Dieterlen* 509 (PRE, SAM).

—2927 (Maseru): Near St. Agnes' Mission, Teyateyaneng (-BB), *Trewen* 814 (PRE).

Inexact localities: Weenen Country, Natal, *Wood* 910 (BM, BOL, MO, SAM); Zwischen Greytown and Newcastle, *Wilms* 2298 (BM, K); Natal, *Dunne* s.n. (BM), *Cooper* 3231 (K); Near Mooi River, *Wood* 3443 (K); Tugela valley, *Allison* s.n. (K); Bushmans river, *Wood* 10762 (MO); Upper Moodies, Barberton, *Hayden* in herb. Galpin 1183 (BOL, K, SAM).

2. *Haemanthus carneus* Ker Gawler in Bot. Reg. 6: t. 509 (1821); Hook. in Bot. Mag. 61: t. 3373 (1834); Herbert, *Amaryllid.*: 234 (1837); Baker, *Handb. Amaryllid.*: 67 (1888) and in *Flora Cap.* 6: 233 (1896); Friis & Nordal in *Norw. J. Bot.* 23: 70 (1976) excl. *H. humilis* Jacq., *H. lanceifolius*

Jacq., *H. brevifolius* Herbert, *H. strigosus* Herbert, *H. carneus* Ker Gawler var. *strigosus* (Herbert) Baker, *H. roseus* Hort. ex Link, *H. hirsutus* Baker, *H. candidus* Bull and *H. nelsonii* Baker. Type: South Africa, plate 509 in Bot. Reg. 6 (1821) (lectotype, Friis & Nordal, 1976).

Serena carneia (Ker Gawler) Raf., Flora Telluriana 4: 20 (1838).

Melicho carneus (Ker Gawler) Salisb. ex Baker in Flora Cap. 6: 234 (1896), in synonymy only, combination not made by Salisbury.

Bulb ovoid, more or less medianly compressed, up to 70 mm across; tunics more or less equal, with horizontally truncate margins, cream-coloured, the outer parts mostly withered and brown. *Leaves* 2 or 3, mostly flat on ground, sometimes recurved, present with the inflorescence or appearing shortly after; blade broadly to narrowly elliptic or ovate, 100–210 mm long, 35–135 mm wide, flat; both surfaces light green, immaculate, softly pubescent or glabrous; margins ciliate; apex acute or obtuse. *Peduncle* erect, 60–270 mm long, 7–12 mm across widest diam., green to brownish-red, softly pubescent, rarely glabrous. *Umbel* loose, globose, 45–90 mm across. *Spathe valves* 5–7, spreading and soon becoming reflexed, shorter than the flowers, narrowly lanceolate, 13–20 mm long, 2–5 mm wide, membranous, rose-pink with darker veins, tips acute. *Flowers* 30–120, rose-pink. *Pedicels* 11–25 mm long, brownish-red. *Perianth* 11–13 mm long; tube 2.5–3.5 mm long, more or less cylindrical, gradually widening upwards, segments slightly spreading, narrowly oblong to lanceolate, 8.5–10 mm long, 1.5–3 mm wide; tips acute to obtuse. *Filaments* included, less than half as long as the segments at anthesis, 1–3 mm long with alternate filaments 3–4 mm long, white to pale pink. *Anthers* small, 1 mm when open, yellow. *Ovary* subglobose, 1–2 mm across, green to reddish-brown. *Style* short, 3–7 mm long. *Berries* not known.

Flowering time: January to March.

Leafing period: leaves appear during the flowering time or shortly after and persist sometimes until spring or early summer.

Distribution and habitat: known from very few sites in the Orange Free State, Natal midlands and the eastern Cape near Somerset East and Grahamstown from 300–1 200 m above sea level. Groups of bulbs are found mostly in shade either under trees and bushes or amongst rock outcrops (Fig. 11).

Haemanthus carneus is easy to distinguish by its floral characters. The umbel of widely spreading pink flowers is very loose and globose. Unlike any other species in the genus, the stamens at anthesis are included well within the perianth, always less than half the length of the segments.

Vegetatively, it is very like *H. humilis*. The bulb is usually compressed in the median plane with more or less even tunics. The light green immaculate

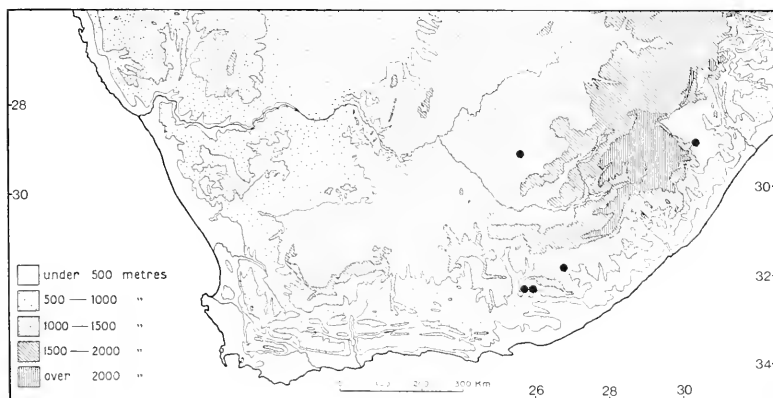


FIG. 11.
Distribution of *H. carneus* Ker Gawler

leaves are fleshy and range from hairy to smooth with ciliate margins.

Since its original description (Ker Gawler, 1821), Baker (1888, 1896) and later Friis & Nordal (1976) amplified *H. carneus* considerably to include a wide range of pink-flowered specimens from the summer rainfall region. An examination of the specimens placed into Friis & Nordal's *H. carneus* complex revealed two quite distinct groups. One small group has stamens well included and less than half the length of the perianth segments, whereas the other large group has stamens ranging from well exerted to equal in length to the segments. No intermediates between the groups are known. As no other taxa are known to have included stamens at anthesis, the character is given sufficient weight to maintain *H. carneus* as a separate, narrowly defined species, while the specimens with longer stamens have been assigned to the more variable species *H. humilis*.

Most collections of *H. carneus* come from the high-lying areas of the eastern Cape, particularly the Boschberg. Outliers are known from the Natal midlands and the Orange Free State. The range is remarkably disjunct, but further collecting in the southern Drakensberg may yet add new records.

ORANGE FREE STATE—2925 (Jagersfontein): Fauresmith (-CB), *Smith 5604* (PRE).

NATAL—2929 (Underberg): Lowlands near Estcourt (-BB), *Schelpé* sub NBG 111/42 (NBG).

CAPE—3225 (Somerset East): Somerset East (-DA), *Harries* sub NBG 1170/30 (NBG), *Wisura 1063* (NBG), *West 281* (GRA); Boschberg mountains (-DA/-DC), *Bruce 521* (PRE).

—3326 (Grahamstown): Plutovale, Grahamstown (-BA), *Wisura 1098* (NBG).

3. *Haemanthus montanus* Baker in Flora Cap. 6: 234 (1896); Snijman in Jl S. Afr. Bot. 48: 100 (1982). Type: South Africa, Natal, in valley of Buffaloriver near Charlestown, 5000–6000 ft., fl. 8/12/1892, Wood 4810 (K, holotype; BM, E, PRE, isotypes).

H. amarylloides sensu Baker (non Jacq.), Handb. Amaryllid.: 68 (1888) and in Flora Cap. 6: 234 (1896); sensu Sealy (non Jacq.) in Bot. Mag. N.S. 174: t. 415 (1963); sensu Friis & Nordal (non Jacq.) in Norw. J. Bot. 23: 70 (1976) excl. *H. pumilio* Jacq.

Bulb solitary or in clumps, ovoid to pyriform, circular or somewhat medianly compressed in cross section, up to 80 mm across; tunics more or less equal, with horizontal or slightly oblique margins, cream-coloured, the outer parts sometimes dark brown and papery. *Leaves* 2, occasionally 3, erect, appearing at the time of flowering, rarely a little later; blade narrowly to broadly lorate, 150–250 mm long, 15–50 mm broad near the middle, flat or sometimes twisted; both surfaces green or glaucous, without markings, or sometimes flushed with red towards the base, glabrous; margin smooth, sometimes raised or opaque; apex obtuse to acute. *Peduncle* up to 400 mm long, 7–12 mm across greatest diam., green to reddish, glabrous. *Umbel* obconical to hemispherical, 40–90 mm across. *Spathe* valves 5–8, spreading and soon becoming reflexed, shorter or longer than the flowers, triangular to lanceolate, 25–40 mm long, 4–13 mm wide at the base, pale pink, membranous; tips acute. *Flowers* 30–70 or sometimes more, white, sometimes with a pink blush when old. *Pedicels* 7–20 mm long, green. *Perianth* 10–14 mm long; tube 1–2 mm long, somewhat funnel-shaped; segments spreading, lanceolate, 9–13 mm long, 1–2 mm wide; tips acute. *Filaments* slightly exerted, at most by 3 mm, white. *Anthers* 1.5–3 mm long when open, yellow. *Ovary* subglobose, approximately 2 mm diam. *Style* equalling the filaments. *Berries* not recorded.

Flowering time: October to December.

Leafing period: appearing from October to December and dying back in winter.

Distribution and habitat: eastern regions of southern Africa, from as far south as King William's Town in the Cape Province, to the midlands of Natal, the Orange Free State and the Transvaal highveld. Populations of 20 to 200 individuals occur in grasslands either along river banks, poorly drained flats or periodically dry vleis. In nature, bulbs flower well after fires (Jeppe, pers. comm.) (Fig. 12).

Haemanthus montanus is distinguished by an umbel of spreading white to pink flowers and membranous spathe valves which soon become reflexed.

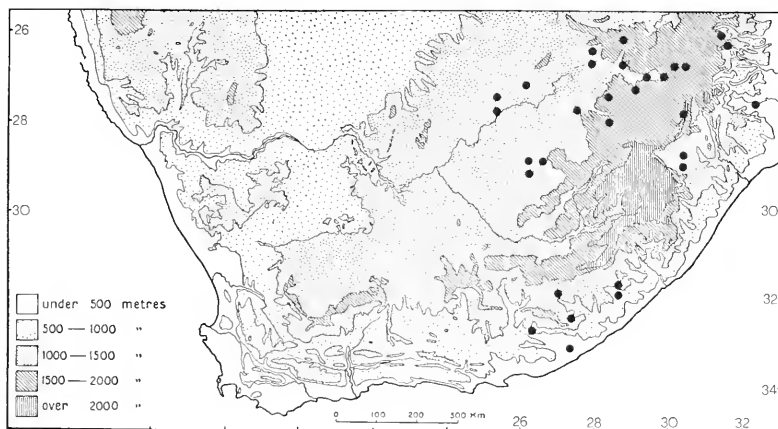


FIG. 12.
Distribution of *H. montanus* Baker

The leaves, which appear at flowering time or very shortly afterwards, are lorate, entirely glabrous and erect, while the bulb is round to medianly compressed with more or less equal tunics. Its closest ally is *H. avasmontanus* from central Namibia, from which it can be distinguished by its more numerous spathe valves, shorter perianths and its preference for flat, seasonally wet habitats.

In the absence of leaves, *H. montanus*, which shares the same geographical range as *H. humilis*, can be distinguished from *H. humilis*, as follows. The peduncle of *H. montanus* is always glabrous and the perianth tube is very short (1–2 mm long), whereas in most specimens of *H. humilis* the peduncle is more or less pubescent and the perianth tube is mostly longer than 2 mm.

Haemanthus montanus was first recorded by J. F. Drège, between Gekau and the Bashee river in the Transkei during his expedition to Zululand in 1832 and thereafter by Zeyher & Burke along the Mooi river in 1841, probably near Potchefstroom (Gunn & Codd, 1981: 385). The species has since been widely collected throughout the summer rainfall region of South Africa, but following Baker's treatments (1888, 1896) it was largely confused with Jacquin's *H. amarylloides*, a similar but distinct species from Namaqualand (Snijman, 1982). The species must now be known as *H. montanus*, the only epithet applicable to this eastern southern African plant.

TRANSVAAL—2530 (Lydenburg): 50 miles east of Carolina (-DC), *Reynolds 2143* (PRE).

—2627 (Potchefstroom): 7 miles east of Welverdiend (-AD), *Louw 71* (PRE); Near Mimosa Park, Potchefstroom (-CB), *Louw 1100* (PRE).

—2628 (Johannesburg): Near Premier Paper Mills, Germiston (-AA), *Codd 4470* (K, PRE); Henley-On-Klip (-CA), *Moss s.n.* (K), *Moss* sub NBG 651/41 (NBG); Spruit near Val station (-DD), *Smuts 391* (PRE).

—2629 (Bethal): Near Vaal River, Standerton (-CD), *Sim 3590* (PRE); 4 miles west of Morgenzon (-DA), *Mauve 4464* (K); Vereeniging (-DB), *Leslie 10909* (PRE).

—2630 (Carolina): Steynsdorp (-BB), *Dieperink 140* (PRE).

—2725 (Bloemhof): Jantjieshoek, 12 miles north east of Wakkerstroom (-AC), *Devenish 179* (PRE); Thornhill farm, Wolmaransstad (-BB), *Mainwaring 2794* (PRE); Pringles farm, Christiana (-CC), *Burt Davy 5539* (PRE).

—2731 (Louwsburg): 25 miles north west of Pongola settlement on road to Piet Retief (-BC), *Codd 2105* (PRE).

ORANGE FREE STATE—2727 (Kroonstad): Heilbron (-BD), *Goosens 521* (PRE); Farm Rondavel Noord, west of Kroonstad (-CA), *Scheepers 1752* (PRE); 12,8 miles from Lindley on road to Heilbron (-DD), *Marais 1092* (K, PRE).

—2728 (Frankfort): Villiers (-BA), *Kresfelder s.n.* (PRE).

—2826 (Brandfort): Farm Peilkop (-CC), *Bourquin 853* (PRE); Glen (-CD), *Heyiule s.n.* (PRE).

—2826 (Bloemfontein): 13 miles north of Bloemfontein (-AA), *Archibald 6129* (GRA).

NATAL—2729 (Volksrust): In valley of Buffalo river, near Charlestown (-DB), *Wood 4810* (BM, E, K, PRE).

—2829 (Harrismith): Near Colenso (-DB), *Mauve 4464* (K, PRE); 5 km from turnoff outside Estcourt towards Weenen (-DD), *van Rensburg 95* (E).

CAPE—3126 (Queenstown): Queenstown (-DD), *Galpin 1676* (GRA, K, PRE), *Everitt s.n.* (PRE), *Koopowitz s.n.* (GRA).

—3128 (Umtata): Gcigcira near Baziya (-CB), *Baur 568* (K, SAM); Munya near Idu-tywa (-CD), *Evans s.n.* (GRA, PRE).

—3226 (Fort Beaufort): Kagaberg (-CA), *MacOwan 2248* (SAM).

—3227 (Stutterheim): 5 miles south of Cathcart on the Hogsback road (-AC), *Archibald 6097* (GRA).

—3327 (Pieddie): Line Drift near Kingwilliamstown (-AA), *Leighton* sub NBG 272/32 (BOL).

Inexact localities: Mooye River, Betchuana country, *Zeyher 1655* (SAM); Mooye River, *Burke* (K, SAM); Buffelshoek, Magaliesberg, *Gifillan 1406* (PRE); Bamboespruit, *Nelson 244* (K); Lower Klipriver, Moss herb. 26866 (PRE); Klip River Valley, *Moss 13806* (BM); Klip River on road from Vereeniging, *Verdoorn 2343* (PRE); Modder River near Bloemfontein, *McNeil s.n.* (K); Kroonstad district, *Pont 523* (PRE); Hills between Bedford and Esterhuysens Poort, *MacOwan 2248* (K); Between Grahamstown and Bedford, *Dyer 2324* (K); Between Gekau and Bashee Rivers, *Drege 4524* (BM, E, K); Between Hogsback and Cathcart, *Barker 2352* (NBG).

Doubtful locality: Oudtshoorn, *Ryder 94* (K).

4. *Haemanthus avasmontanus* Dinter in Fedde Repert. **19**: 186 (1923), as *H. avasimontanus*; in Fedde Repert. **29**: 259 (1931); Sölch in Merxmüller (ed.), Prod. Südwestafrika Part **150**: 10 (1969). Syntypes: Südwestafrika, Auasberge bei Tigerfontein, fl. 12/2/1923, *Rusch s.n.* (inflorescence) (B), *Dinter 4465* (leaves) (B). **Figs 13 and 14.**

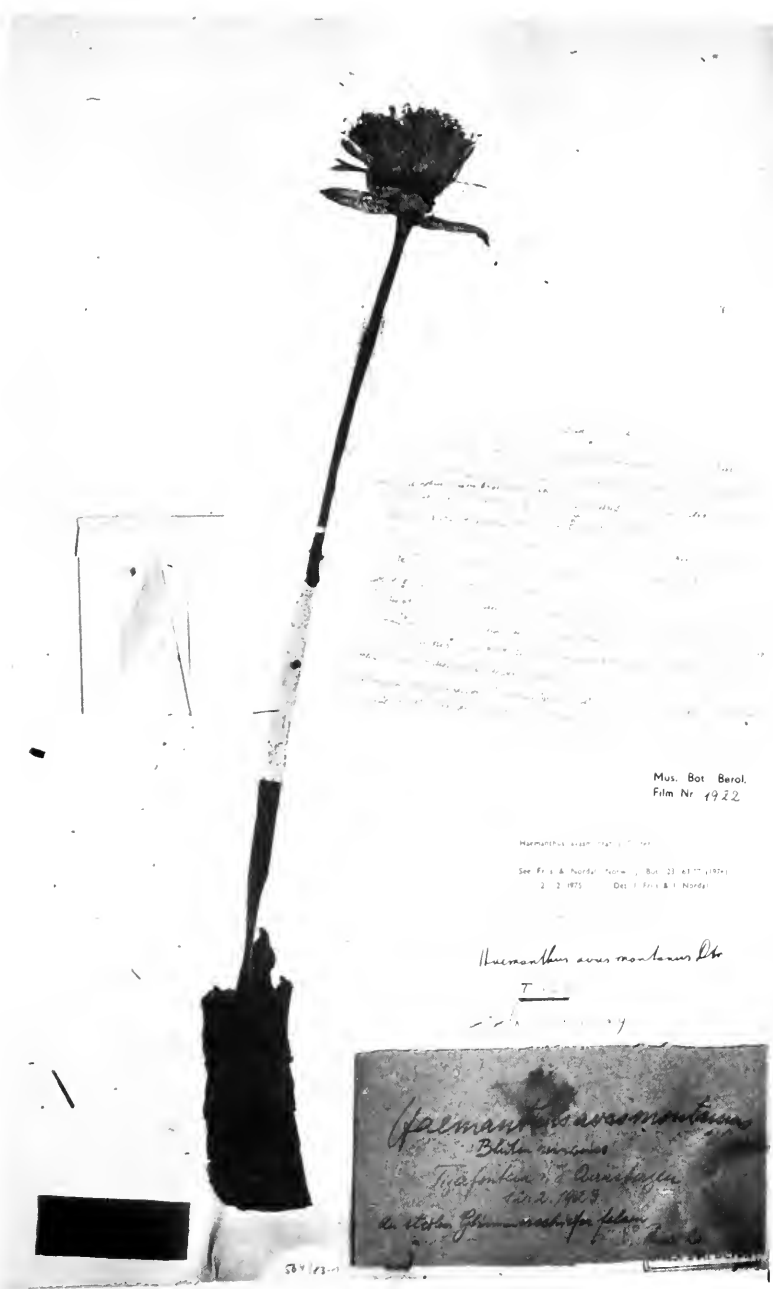


FIG. 13.
Type material of *H. avasmontanus* Dinter (Rusch s.n., B)



FIG. 14.
Type material of *H. avasmontanus* Dinter (Dinter 4465, B)

Bulb ovoid, medianly compressed, 45 mm broad, forming bulblets; tunics with horizontal edges, the outer parts brown and papery. *Leaves* 2, erect, just beginning to appear at flowering time; blade lorate, 350–400 mm long, 40–45 mm wide, glabrous, soft in texture; margin smooth; apex acute. *Peduncle* 250–350 mm long, about 7 mm wide. *Umbel* narrowly obconical, about 45 mm across. *Spathe valves* 4–5, somewhat spreading, about as long as the flowers, lanceolate, 25–30 mm long, about 6 mm broad, brownish-white, membranous; tips acute. *Flowers* 15–20, pure white. *Pedicels* 7–10 mm long. *Perianth* about 20 mm long; tube 2.5–3 mm long; segments slightly spreading, linear to lanceolate, about 17 mm long, 1–2 mm wide; tips acute. *Filaments* exerted by up to 3 mm, white. *Anthers* 1 mm long when open, yellow. *Ovary* ovoid, 2–3.5 mm diam. *Style* as long as the stamens. *Berries* not known.

Flowering time: February.

Leafing period: the leaves are just visible at flowering time but attain their full length by winter.

Distribution and habitat: known only from the Auasberge, south east of Windhoek in central Namibia. The species is recorded growing on steep south-facing micaceous schist ledges (Fig. 15).

Although the species is known from the type specimens only, it is undoubtedly distinct. The Rusch collection of a solitary inflorescence is amply annotated by Dinter, while the only other extant specimen at Berlin (*Dinter 4465*), clearly shows the bulb and leaves. The white flowers, the spreading

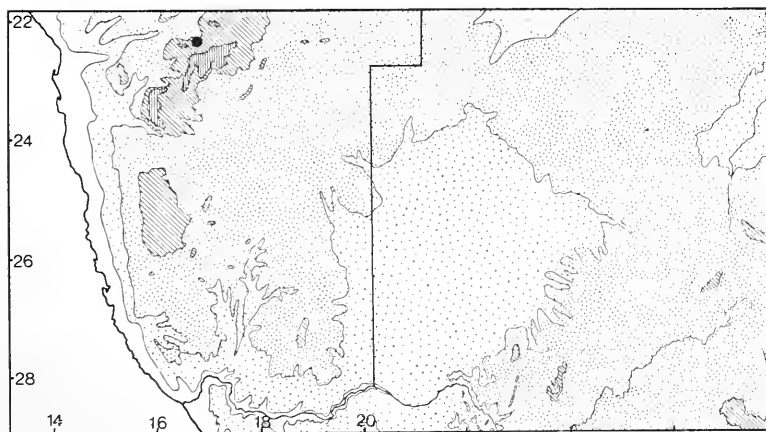


FIG. 15.
Distribution of *H. avasmontanus* Dinter

membranous spathe valves, the glabrous lorate leaves and the bulb with its more or less even tunics, indicate a close affinity to *H. montanus*. The characters serving to separate these two species are as follows. *Haemanthus avasmontanus* has few spathe valves (4–5), long perianths (about 20 mm long) and a habitat preference for steep rocky slopes, whereas *H. montanus*, which is widely collected from the eastern regions of South Africa, has more numerous spathe valves (5–8), consistently shorter perianths (10–14 mm long) and occupies habitats which are mostly flat and seasonally water-logged.

The spelling of the epithet, *H. avasimontanus*, is regarded here as a typographic error. Dinter originally inscribed the type sheets as *H. avasimontanus*; the same rendering chosen for his amplified description of the species in a later publication (Dinter, 1931).

NAMIBIA—2217 (Windhoek): Auasberge, Tigerfontein (-CA), *Rusch s.n.* (B), *Dinter 4465* (B).

5. *Haemanthus crispus* Snijman in *Jl S. Afr. Bot.* **47**: 829 (1981). Type: South Africa, Cape Province, Namaqualand, 61 km north of Vanrhynsdorp towards Nuwerus, fl. 28/3/1981, *Snijman 410* (NBG, holotype; K, MO, PRE, S, isotypes). **Plate 4.**

H. undulatus Herbert, *Amaryllid.*: 233 (1837), nom. illegit. non *H. undulatus* (L.) Thunb., *Prod. Pl. Cap.*: 58 (1794), probably = *Nerine undulata* (L.) Thunb.

Bulbs mostly forming clumps or occasionally solitary, obclavate to globose, round in cross section or slightly compressed in the median plane, up to 60 mm diam.; tunics unequal, in overlapping horizontal layers, cream-coloured, the outer parts brown and papery. *Leaves* 2, occasionally 1 or 3, suberect or recurved, appearing shortly after the inflorescence; blade lorate, 110–200(–350) mm long, 7–20(–33) mm wide, canaliculate; both surfaces green or glaucous, sparsely to densely covered with short, stiff hairs or entirely glabrous, abaxial surface with dark green and maroon blotches, somewhat ribbed towards the base; margins sinuate to undulate throughout, or towards the base only, rarely entirely flattened, usually outlined with red; apex acute. *Peduncle* up to 150 mm long, 3.5–12 mm across greatest diam., red, immaculate or with darker red mottling, sometimes pale to deep pink, glabrous. *Umbel* compact, obovoid to obconical, 15–40 mm wide above. *Spathe valves* 4–5(–6), erect, equalling the flowers or sometimes slightly longer, broadly to narrowly obtrullate or spatulate, 22–40 mm long, (6–)13–35 mm broad above the middle, coral to scarlet or pink, waxy; tips

PLATE 4.

H. crispus Snijman (*van Jaarsveld 5327*, Sannagas) 1 inflorescences \times 1; 2 spathe valve \times 1; 3 flower \times 1; 4 bulb and leaves \times 1; 5 half flower \times 2.



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E.W. 5327 SANNAGAS

mostly obtuse and mucronate, occasionally acute. *Flowers* 6–25, coral to scarlet or sometimes pink, whitish at the base and tips. *Pedicels* 0,5–4 (–7) mm long, pale scarlet or pink. *Perianth* 15–26 mm long; tube 1,5–9 mm long, gibbose at the base of each segment; segments erect, linear to narrowly spatulate, 12–20 mm long, 0,75–2 mm wide; tips obtuse. *Filaments* exerted by up to 10 mm, whitish to pale scarlet or pink. *Anthers* 1–2 mm long when open, yellow. *Ovary* subglobose, 2–4 mm diam., green to rosy. *Style* slightly exceeding the stamens. *Berries* spherical, 13–20 mm diam., pale pink and pulpy when ripe, tightly clustered together. *Seeds* 1–4, globose, up to 10 mm diam., dark wine-red.

Flowering time: March–April (–May); usually up to a month earlier in cultivation.

Leafing period: leaves emerge sometimes as early as March and die back by October.

Distribution and habitat: abundant throughout Namaqualand from Steinkopf in the north to the Olifants River in the south, extending from the coastal plain in the west onto the first escarpment in the east; an area of low rainfall (120–360 mm per annum) with a cover of mostly low succulent bushes. Populations usually consist of numerous large clumps of bulbs but in the extreme west and east, the bulbs tend to be more solitary and widely scattered (Fig. 16).

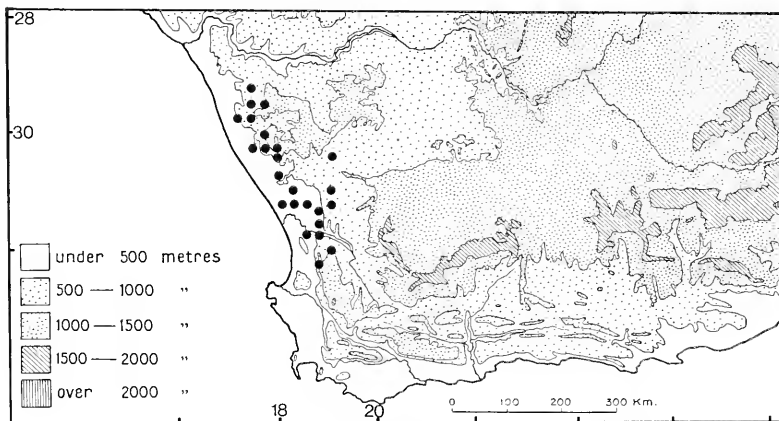
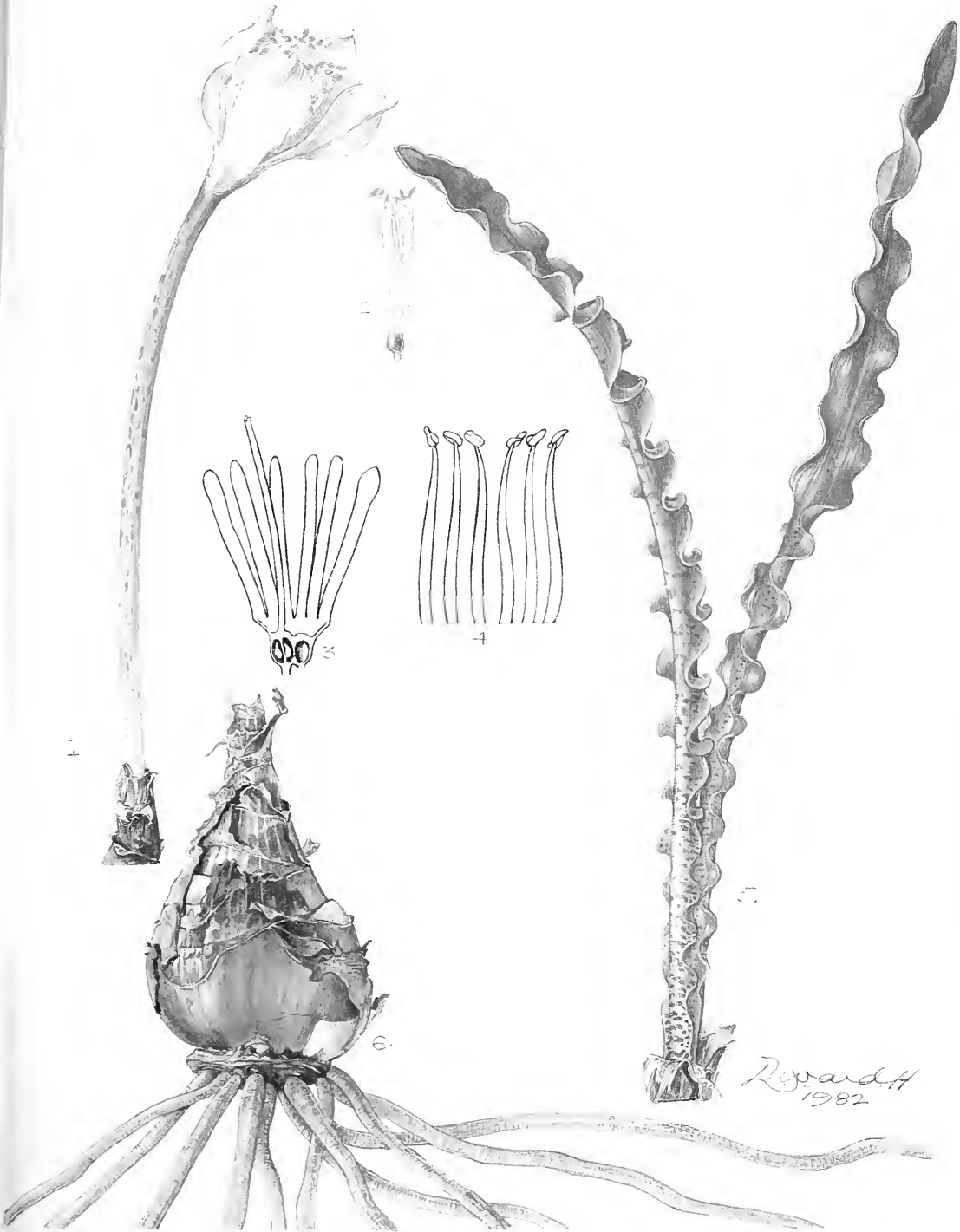


FIG. 16.
Distribution of *H. crispus* Snijman

PLATE 5.

H. crispus Snijman (Snijman 428, Koebee Pass) 1 inflorescence \times 1; 2 flower \times 1; 3 section of flower \times 1,5; 4 filaments \times 1,5; 5 leaves \times 1; 6 bulb \times 1.



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Haemanthus crispus is easily distinguished as follows. The bulb tunics are unequal, dying down to form horizontal layers. The leaves are narrowly lorate (7–33 mm wide), canaliculate towards the base with undulate margins ranging from the length of the leaf to near the base only. The inflorescences are usually short, red or rarely pink, with narrowly obconical umbels, surrounded by 4–6, erect, obtrullate spathe valves. The flowers have very short pedicels, usually less than 5 mm.

The species varies considerably in the size, colour and pubescence of the leaves but with no apparent geographic pattern. The blade may be very narrow or broad, green or glaucous, either covered with short stiff hairs or completely smooth. Only very rarely are the leaves smooth edged. These may sometimes be confused with the equally narrow leaves of *H. pubescens* subsp. *arenicolus* which grows sympatrically with *H. crispus* on the sandy coastal plain of Namaqualand. The bulb morphology of the two taxa however, is sufficiently different to distinguish the species.

The inflorescences are not as variable. Most populations have red inflorescences with broad (13–35 mm wide), bluntly obtrullate spathe valves. However, a single population from the escarpment at the Koebee Pass (*van Berkel* 209, *Snijman* 428) has pink inflorescences with narrow (6–13 mm wide), acuminate, obtrullate spathe valves (Plate 5). The occurrence of occasional pink colour forms, in what is predominantly a red-flowered species, is not unusual, being known in *H. pubescens*, *H. canaliculatus* and *H. sanguineus*.

The bulb morphology of *H. crispus* is somewhat unusual in the genus. Unlike the majority of species from the winter rainfall region, the bulb tunics die down horizontally to form an overlapping series of layers with parallel edges. The bulbs do not have the distichous arrangement of tunics, as is found in the majority of winter rainfall species, *H. pubescens*, *H. coccineus*, *H. sanguineus* and their close allies. The only other species which have bulbs similar to those of *H. crispus* are *H. barkerae* and *H. tristis*, from the western Karoo, with which it appears to form a closely related group.

For many years *H. crispus* was referred to in South African herbaria as *H. undulatus* Herbert. The use of Herbert's name, however, is invalidated by the prior existence of *H. undulatus* (L.) Thunb., probably a synonym of *Nerine undulata* (L.) Thunb.

CAPE—2917 (Springbok): Steinkopf (-BC), *Stayner* sub KG 347/69 (MO, NBG); About 10 km south of turnoff to Komaggas along road to Soebatsfontein (-CD), *Snijman* 187a (NBG); Niegramoep (-DA), *Wikner s.n.* (SAM 63136); Farm

PLATE 6.

H. barkerae Snijman (*Snijman* 132, Calvinia/Loeriesfontein) 1 inflorescence \times 1; 2 flower \times 2; 3 half flower \times 3; 4 bulb and leaves \times 1; 5 section of leaf \times 3.



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Driekoppe, south of Springbok (-DB), *Snijman 421* (K, NBG, PRE); O'Okiep, *Gif-fen* sub *Marloth 11955* (PRE); Concordia, *Krapohl* sub *Marloth 5788* (PRE); Sannagas (-DC), *van Jaarsveld 5327* (NGB).

—3017 (Hondeklipbaai): 8 km west of national road N7 towards Grootvlei (-BB), *Snijman 414* (MO, NBG, PRE); 4 km west of farm Outuin, ascending Kamiesberg Pass, *Snijman 423* (K, MO, NBG, PRE); Farm Windheuwel between Wallekraal and Garies (-BC), *Snijman 708* (NGB); Brakdam, 12 km north of Garies (-BD), *Bayer 349* (NGB); Darters Grave, 22 miles north of Garies, *Booyens 12* (NGB), *Middlemost 2157* (NGB), *Snijman 412* (NGB, PRE).

—3018 (Kamiesberg): South west slopes of Kamiesberg, along Studers Pass (-AC), *Snijman 426* (NGB, PRE); About 4,5 km south of Welkom (-AC-CA), *van Berkel 117* (NGB, PRE); 14,5 km north of Bitterfontein towards Garies (-CC), *Snijman 427* (K, NBG, PRE).

—3019 (Loeriesfontein): Farm Haasriver, north west of Loeriesfontein (-CA), *Snijman 664* (NGB); Farm Taaiboshok, north west of Loeriesfontein, *Snijman 643* (NGB, PRE).

—3118 (Vanhynsdorp): 61 km north of Vanhynsdorp towards Nuwerus (-AB), *Snijman 410* (K, MO, NBG, PRE, S); 2 km north of Bitterfontein towards Garies, *van Berkel 119* (K, NBG, PRE); Just beyond turnoff to Middelkraal on road towards Komkams (-AC), *Snijman 704* (NGB); 66 km north of Klaver beyond Koekenaap (-AD), *Snijman 701* (NGB); Farm Steenkampskraal (-BC), *Hall 4113* (NGB); 2 km south of gate to Sandkraal farmhouse (-DB), *Snijman 429* (NGB); Top of Koebee Pass, *van Berkel 209* (NGB), *Snijman 428* (K, MO, NBG, PRE); Klaver (-DC), *Compton* sub NBG 308/22 (BOL); 2,6 miles west of N7 road from Trawal towards Skurfkop, *Hardick* sub NBG 889/71 (NGB, PRE); Top of Nardouws Pass ascending from near Trawal, *Snijman 289* (NGB); North of Bulshoek Barrage (-DD), *Barker 7304* (NGB).

—3119 (Calvinia): About 11 km north east of Grasberg towards Theunisdrift (-AA), *Snijman 140* (NGB); Foot of Vanrhyns Pass (-AC), *Snijman 142* (NGB).

—3218 (Clanwilliam): Farm Alpha at Algeria turnoff (-BD), *Fisher 13* (NGB).

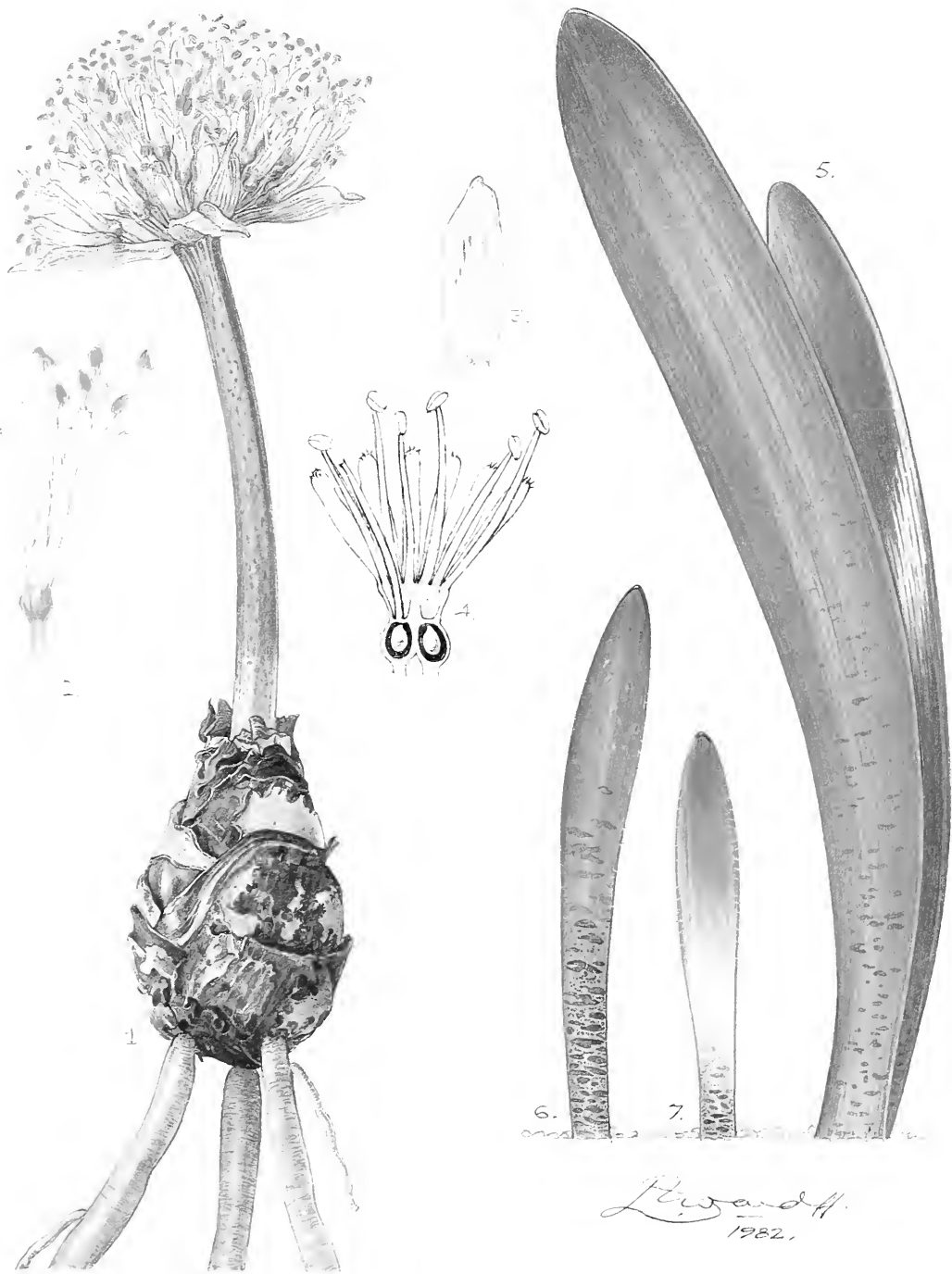
—3219 (Wuppertal): Pakhuis (-AA), *Salter 7523* (NGB).

6. *Haemanthus barkeriae* Snijman in JI S. Afr. Bot. 47: 832 (1981). Type: South Africa, Cape Province, 63,5 km from Calvinia towards Loeriesfontein, fl. NBG 14/4/1980, *Snijman 132* (NGB, holotype; PRE, isotype). **Plates 6 and 7.**

Bulbs forming clumps, globose, ovoid or obclavate, more or less round or slightly laterally compressed in cross section, up to 50 mm diam.; tunics unequal, overlapping, with margins either horizontal or oblique, cream-coloured, the dead parts remaining as a dark brown papery covering; the neck sometimes spotted with pink. *Leaves* 2, occasionally 1, recurved to suberect, appearing after the inflorescence; blade narrowly to broadly ligulate, to elliptic, 90–260(–340) mm long, (7–)20–55(–80) mm wide at the

PLATE 7.

H. barkeriae Snijman (*Snijman 96*, Die Bos) 1 bulb and inflorescence \times 1; 2 flower \times 2; 3 spathe valve \times 1; 4 section of flower \times 2; 5–7 mature and juvenile leaves \times 1.



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middle, canaliculate towards the base or flat; both surfaces dull to bright green or glaucous, glabrous or with a sparse covering of short or long hairs mostly on the abaxial surface; abaxial surface whitish towards the base, extensively barred with dark green in the lower half and maroon at the very base; margin reddish or green, smooth or sparsely ciliate; apex acute to sub-obtuse. *Peduncle* erect, up to 170 mm long, 4–10 mm across greatest diam., pale pink to brownish-pink or deep pink, sometimes slightly marbled, glabrous or occasionally with a sparse covering of short hairs. *Umbel* more or less spreading, narrowly to broadly obconical, 25–60 mm across. *Spathe valves* 4–6, spreading apart, shorter to longer than the flowers, oblong-lanceolate, 20–50 mm long, 4–16 mm broad near the middle, pale pink to magenta-rose, occasionally almost white, thin-textured but not membranous; tips acute. *Flowers* 7–40, pale pink to deep pink. *Pedicels* (4–)7–18 mm long, whitish to pink. *Perianth* 11–21 mm long; tube 1.5–3 mm long, narrowly campanulate; segments spreading, narrowly oblong to lanceolate, 9–18 mm long, 0.5–2 mm wide; tips obtuse to subacute. *Filaments* exerted by up to 10 mm, pink to white. *Anthers* 1.5–2 mm long when open, yellow. *Ovary* subglobose, 2–3 mm diam., green to brownish-pink. *Style* about as long as the stamens. *Berries* ovoid, 10–15 mm diam., pale pink with a deep pink blush, becoming pulpy, translucent and aromatic when ripe. *Seeds* ovoid, 5–6 mm diam., deep wine-coloured.

Flowering time: March–April; up to a month earlier in cultivation.

Leafing period: from May until October; often grazed back.

Distribution and habitat: the plateau between the Bokkeveld mountains near Nieuwoudtville in the west to the Hantamsberg near Calvinia in the east, bounded by Loeriesfontein in the north and the Tanqua Karoo in the south. The area is characterised by heavy clay soils, low rainfall (200–340 mm per annum) and relatively flat undulating terrain with altitudes of 300–900 m above sea level. The associated vegetation is Acock's Veld type 28, the Western Mountain Karoo. Populations are scattered, varying in size from a few small clumps to groups of up to a hundred individuals growing amongst rocky outcrops or in the shelter of low bushes (Fig. 17).

Haemanthus barkerae has pale to deep pink inflorescences with 4–6 spreading spathe valves. It is the only pink-flowered species with ligulate to narrowly ligulate or elliptic leaves with plane edges and the abaxial surface boldly barred with dark green and maroon. The bulb is round or somewhat laterally compressed in cross section with tunics dying down horizontally or slightly obliquely.

Since first being described, additional material gathered from the foothills of the Roggeveld escarpment has made it necessary to amplify the original description. Specimens from these areas are somewhat larger than those

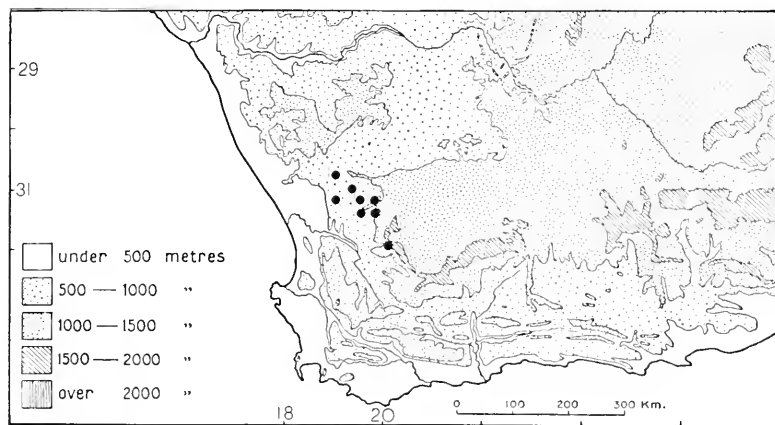


FIG. 17
Distribution of *H. barkerae* Snijman

from the north and have leaves which are not strictly lorate, as originally described, but vary from narrowly ligulate to almost elliptic. Furthermore, the pubescence is variable, being short and stiff in the northern parts of its range to somewhat softer in the south. Plates 6 and 7 depict the extreme forms; *Snijman 132* is from the north near Loeriesfontein and *Snijman 96* is from Die Bos in the south.

Collections of *H. barkerae* were for many years incorporated into South African herbaria under the name *H. pumilio*, due to likeness in floral morphology. The vegetative characters of both species, however, are distinctive and indicate different affinities. The bulbs of *H. barkerae* are more or less round in cross section and have tunics arranged in horizontal layers or slightly obliquely which places the species near to *H. crispus* and *H. tristis*. In contrast the bulbs of *H. pumilio* are distinctly compressed in the lateral plane and have distichously arranged tunics, indicating a closer affinity to *H. canaliculatus*.

The species commemorates Miss W. F. Barker, whose meticulous collections contributed greatly to the knowledge of the genus.

CAPE—3019 (Loeriesfontein): Kloof 3 miles south of Loeriesfontein (-CD), *E. Oliver s.n.* (NBG).

—3119 (Calvinia): Kokerboomkop between Loeriesfontein and Nieuwoudtville (-AB), *Hiemstra & Hardick s.n.* sub NBG 899/71 (NBG); Farm Brandkop, 46.2 km from Loeriesfontein towards Nieuwoudtville, *Snijman 136* (NBG, PRE); 63.5 km from Calvinia towards Loeriesfontein, *Snijman 132* (NBG, PRE); Farm Charley-se-Hoek, Nieuwoudtville (-AC), *Hall 4134* (NBG); Farm Glen Lyon, near Nieuwoudt-

ville, *Mauve & I. Oliver s.n.* (PRE 57721); 11 km east of Nieuwoudtville towards Calvinia, *Snijman 600* (NBG); 1.6 km from Calvinia/Loeriesfontein road towards Turon (-BC), *Snijman 130* (K, NBG); Farm Grootvlakte near Toren, *Snijman 638* (NBG); Akkerdam, lower slopes of Hantamsberg (-BD), *Barker 9341* (NBG); Kareeboomfontein, Calvinia, west of Reunie (-DA), *Hanekom 2374* (PRE); Bloukrans Pass, *Hall sub NBG 417/53* (NBG), *Snijman 623* (NBG); Farm Die Bos, between Ceres and Calvinia (-DC), *Stayner s.n.* (NBG), *Snijman 96* (NBG, PRE), *Snijman 127* (NBG).

—3220 (Sutherland): Between Uintjiesbos and Waaikop (-AC), *Snijman 617* (NBG).

COLLECTIONS OF VEGETATIVE MATERIAL

CAPE—3119 (Calvinia): Bloukrans Pass (-DA), *Snijman 128* (NBG); Farm Dasieberg, south of Calvinia (-DD), *Snijman 620* (NBG).

7. *Haemanthus tristis* Snijman, sp. nov.

Haemanthus tristis Snijman species nova; *H. barkerae* affinis, a qua differt foliis crassis, carnosiss, immaculatis, ligulatis (7–16 mm latis).

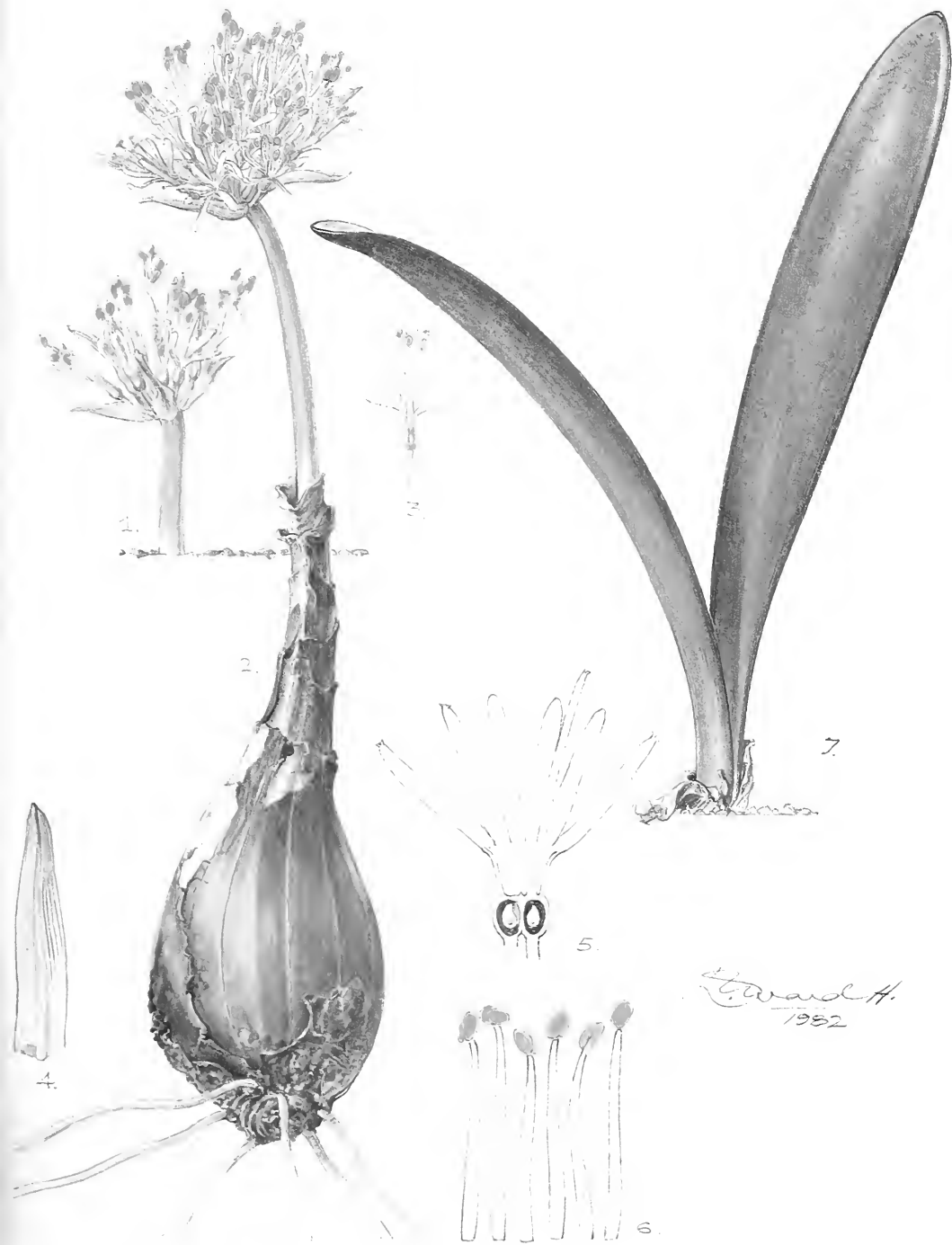
Bulbus profunde hypogaeus, aggregatus, pyriformis, plus minusve rotundus in sectione transversali, 45–60 mm diam., induviatus; tunicas tenues, cremeas, in strata horizontalia imbricata. *Folia* 2, recurva, hysterantha, ligulata, 110–170 mm longa et 7–16 mm lata, canaliculata, crassa et carnosae, glabra, utrinque tristia viridia vel glauca, prope bases rubicundas, marginibus rubicundis et laevibus, apicibus obtusata. *Pedunculus* gracilis, ad 75 mm longus, 5–6 mm diametro maximo, roseus ad laete viridis, immaculatus, glaber. *Umbella* laxa, late obconica vel hemisphaerica, 35–50 mm lata. *Valvae spathaceae* 4–5, patentes, floribus breviorae vel longiorae, anguste lanceolatae, 20–30 mm longae, basi 3–7 mm latae, pallide virides vel cremeae, erubescences, membranaceae, apice acutae. *Flores* 10–20, albidis, erubescences. *Pedicelli* 6–12 mm longi, pallidi virides ad cremei. *Perianthium* 8–11 mm longum; tubo 1.5–3 mm longo; segmentis late patentibus, anguste oblongis, 7–10 mm longis et 1 mm latis, apicibus acutis. *Filamenta* ad 7 mm exserta, cremea ad albida. *Antherae* apertae circa 1 mm longae, luteae. *Ovarium* subglobosum, circa 2 mm diam., pallidum viridem ad cremeum, stylo stamina aequanti. *Baccae* incognitae.

Type: South Africa, Cape Province, 3.2 km towards Bakoven Kloof from the Karoo Poort/Sutherland road, fl. NBG 28/3/1982, *Snijman 510* (NBG, holotype; PRE, isotype) **Plate 8**.

Bulbs deep seated, in clumps, pyriform, more or less round in cross section, 45–60 mm diam.; tunics thin, unequal, overlapping, in more or less

PLATE 8.

H. tristis Snijman (*Snijman 510*, near Bakovenkloof) 1 inflorescence \times 1; 2 bulb and inflorescence \times 1; 3 flower \times 1; 4 spathe valve \times 2; 5 section of flower \times 3; 6 filaments \times 3; 7 leaves \times 1.



PASPALUM TRISTIS SHUMAN

horizontal layers, cream-coloured, the withered parts forming a leathery light brown covering. *Leaves* 2, recurved, appearing shortly after the inflorescence; blade ligulate, 110–170 mm long, 7–16 mm wide at the middle, channelled, thick and fleshy, both surfaces dull green to glaucous, glabrous; abaxial surface flushed with pink towards the base; margins red, smooth; apex obtuse. *Peduncle* slender, up to 75 mm long, 5–6 mm across greatest diam., pink to pale green, immaculate, glabrous. *Umbel* lax, broadly obconical to hemispherical, 35–50 mm across. *Spathe valves* 4–5, spreading apart, shorter or as long as the flowers, narrowly lanceolate, 20–30 mm long, 3–7 mm wide at the base, pale green to cream or white, later turning pink, thin-textured; tips acute. *Flowers* 10–20, white but appearing cream when young, fading to pink. *Pedicels* 6–12 mm long, pale green to cream-coloured. *Perianth* 8–11 mm long; tube 1.5–3 mm long, gradually widening upwards; segments widely spreading, narrowly oblong, 7–10 mm long, 1 mm wide; tips acute. *Filaments* exerted by up to 7 mm, cream to white. *Anthers* 1 mm long when open, yellow. *Ovary* subglobose, about 2 mm diam., pale green to cream-coloured. *Style* as long as the stamens. *Berries* not known.

Flowering time: March.

Leafing period: April to October, often nibbled down by sheep when still green.

Distribution and habitat: known from one locality only in the extreme south east of the Tanqua Karoo at an altitude of 300 m. The population consists of scattered clumps of bulbs growing in deep shaley soil in seasonal washes. The surrounding plant cover is very sparse; predominantly low succulent bushes. The annual rainfall is approximately 90 mm (Fig. 18).

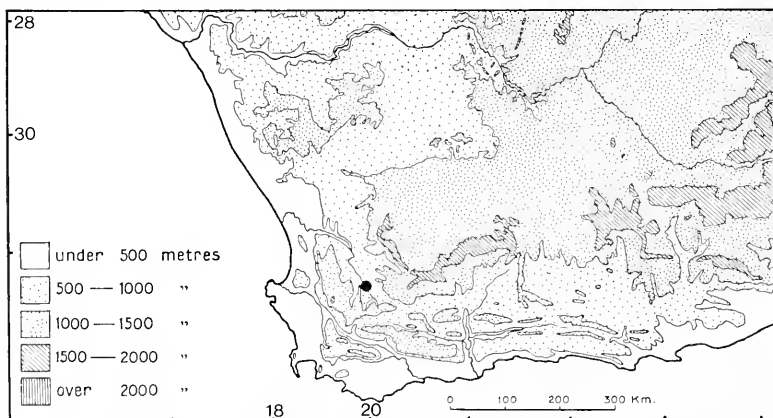


FIG. 18.
Distribution of *H. tristis* Snijman

Haemanthus tristis is most closely related to *H. barkeræ*. Both species have similar bulbs and inflorescences with white or pink flowers and 4–5 spreading spathe valves. The distinguishing characters are the leaves. The blades of *H. tristis* are narrowly ligulate and channelled (7–16 mm across), thick, fleshy and glabrous, and apart from a flush of red towards the base and a thin border of red on the margins, they are without distinct markings. The bulbs are round in cross section with tunics dying down more or less horizontally. In contrast the leaves of *H. barkeræ* are always barred with red or dark green and are sometimes pubescent.

The species was first collected by Miss Pauline Perry, of the National Botanic Gardens, as recently as 1977. Her work on the cultivation of geophytes has often led to the discovery of rare and unknown species, particularly in the areas of special interest to her, namely Namaqualand and the western Karoo.

CAPE—3219 (Wuppertal): 3.2 km towards Bakoven Kloof from Karoo Poort/Sutherland road (-DD). *Perry 186* (NBG). *Snijman 209* (NBG). *Snijman 510* (NBG, PRE).

8. *Haemanthus namaquensis* R. A. Dyer in Fl. Pl. S. Afr. 20: pl. 793 (1940) and in *Herbertia* 15: 14 pl. 315 fig. 3 (1948). Type: South Africa, Cape Province, 10 miles north west of Steinkopf, *Dyer & Verdoorn 3674* (PRE 26355, holotype).

Bulbs forming clumps, large, broadly ovate, laterally compressed, up to 130 mm across, tunics very thick, imbricate and distichous, cream-coloured, with oblique margins; the neck often with a pink blush or pink speckles. *Leaves* 2, erect, appearing after the inflorescence; blade oblong-lanceolate, 170–450 mm long, 45–110 mm broad at the middle, very thick and tough, flat or somewhat channelled; both surfaces green to glaucous, unmarked or speckled with red towards the base, glabrous; margins more or less sinuate, particularly towards the base; apex acute. *Peduncle* stout, up to 150 mm long, compressed, 13–15 mm across greatest diam., plain red or slightly mottled, glabrous. *Umbel* compact, medianly compressed, about 50 mm across. *Spathe valves* 7–8, erect, as long as or slightly shorter than the flowers, oblong-lanceolate, 32.5–40 mm long, 6–15 mm broad at the middle, red, firm but not fleshy; tips somewhat acute. *Flowers* about 40, scarlet with whitish tubes and tips. *Pedicels* 10–20 mm long, pale scarlet to white. *Perianth* 18–25 mm long; tube 2.5–4 mm long, slightly swollen at the base of each segment; segments erect, narrowly oblong, 15.5–22 mm long, 0.5–1 mm wide; tips obtuse. *Filaments* exerted by up to 9 mm, pale scarlet with white tips. *Ovary* subglobose 2–4 mm diam., pale green to pale scarlet. *Style* as long as the stamens. *Berries* not known.

Flowering time: March–April, rarely February; recorded only in cultivation.

Leafing period: May until October.

Distribution and habitat: restricted to the escarpment between southern Namibia and Karkams in Namaqualand, at elevations ranging from 300 to 900 m above sea level. The annual rainfall in the area varies from 120 to 220 mm per annum. The species favours sheltered habitats in the protection of low shrubs and succulent bushes or wedged between granite rocks. Populations of as many as ten plants have been seen at some sites but usually the numbers are fewer with the bulbs more widely scattered (Fig. 19).

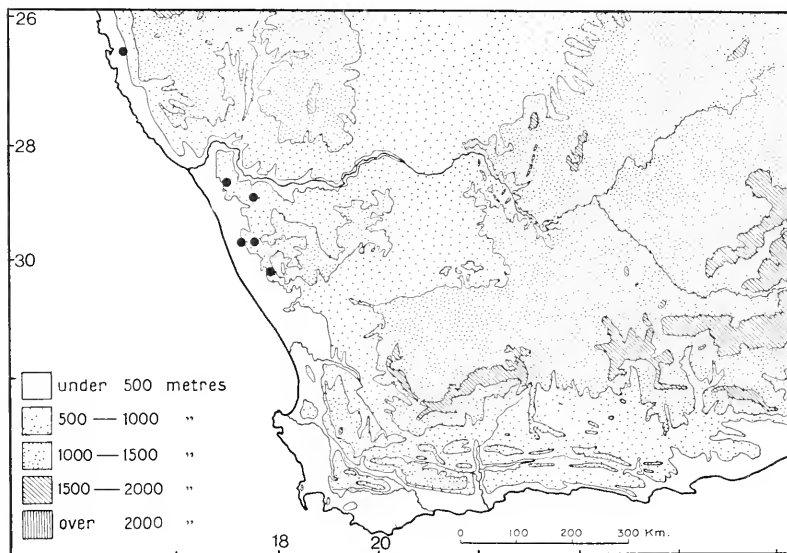


FIG. 19.
Distribution of *H. namaquensis* R. A. Dyer

Haemanthus namaquensis is distinguished by large, fleshy bulbs with imbricate, distichous tunics; erect, broad (45–110 mm wide), very thick, oblong-lanceolate leaves which are green to glaucous and sinuous; bright scarlet inflorescences with narrowly compressed umbels, surrounded by 7–8 erect, oblong-lanceolate spathe valves.

When Dr. R. A. Dyer and Dr. I. C. Verdoorn first discovered the species in 1937, it was known only from the type locality near Steinkopf. Collections have since been made from southern Namibia to Karkams,

greatly extending the knowledge of the species' range. Nonetheless, it still remains apparent that the species is rare and the populations widely scattered.

It is noteworthy that bulbs of *H. namaquensis* growing at Kirstenbosch, flower very poorly, contributing to the fact that few flowering specimens have ever been seen. Whether this is true of bulbs in nature, is not yet known, but a tendency to flower only occasionally, may account for the small size of the populations, as well as their scattered occurrence.

The affinities of *H. namaquensis* are not clear. The large distichous bulb and fleshy leaves are similar to *H. coccineus* but the sinuate to undulate leaf margins are only known in *H. crispus*. Cytological studies indicate that *H. namaquensis* has a specialised karyotype found only in the *H. crispus* group (Vosa, 1984). Thus, until *H. namaquensis* is more fully understood, it is placed most conveniently within the *H. crispus* group.

NAMIBIA—2615 (Lüderitz): Southern diamond area Tsaukhaib (-CB), *Hardy 4489* (PRE).

CAPE—2817 (Vioolsdrif): 12 km north west of Eksteenfontein towards Khubus (-CC), *Snijman 170* (NBG).

—2917 (Springbok): 10 miles north west of Steinkopf (-BA), *Dyer & Verdoorn 3674* (PRE 26355); About 5 km north of the Steinkopf/Port Nolloth road towards Kosies, *Snijman 159* (NBG); Kosies road, *Roux 247* (NBG); 1.5 km north of Kosies home-stead, *van Berkel 402* (K); Top of Anenous Pass, *du Plessis 403* (NBG); From 1 to 4 km west of Steinkopf, *Snijman 157* (MO, NBG); Klipfontein, Steinkopf, *Herre s.n.* sub SUG 3638 (BOL); Kourkammaberge (-CD), *van Jaarsveld & Drijfhout 3380* (NBG); North east of Komaggas, 17 km from Spektakel mine turnoff towards Komaggas (-DC), *Snijman 183* (NBG).

—3017 (Hondeklipbaai): About 3 km south west of the village of Karkams (-BD), *van Berkel 294* (NBG).

Inexact localities: Remhoogte, Richtersveld, *Herre s.n.* sub SUG 3678 (BOL); Komaggas, Kirkenberge, *Herre s.n.* sub SUG 3681 (BOL).

9. *Haemanthus albiflos* Jacq., Hort. Schoenbr. 1: 31 t. 59 (1797); Ker Gawler in Bot. Mag. 31: t. 1239 (1809); Redouté, Liliac. 7: t. 398 (1813); Lodd., Bot. Cab. 7: t. 602 (1822); Friis & Nordal in Norw. J. Bot. 23: 69 (1976) excl. *H. baurii* Baker, *H. deformis* Hook.f. and *H. mackenii* Baker. Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 1: t. 59 (1797) (lectotype, designated by Friis & Nordal, 1976).

H. pubescens (β) sensu Ker Gawler (non L.f.) in Bot. Mag. 37: in note to t. 1523 (1813) and in Bot. Reg. 5: t. 382 (1819); Lodd. Bot. Cab. 8: t. 702 (1823).

H. pubescens var. β. *albiflos* (Jacq.) Ker Gawler in Bot. Reg. 12: t. 984 (1826). Type: as for *H. albiflos* Jacq.

Leucodesmis pubescens (L.f.) Raf. sensu Raf. (non L.f.), Flora Telluriana 4: 19 (1838). Type: as for *H. pubescens* L.f.

H. virescens Herbert var. *pubescens* (L.f.) Herbert sensu Herbert (non. L.f.), Amaryllid.: 235 (1837). Type: as for *H. pubescens* L.f.

H. virescens Herbert var. *albiflos* (Jacq.) Herbert, Amaryllid.: 235 (1837), nom. illeg. superfl. pro *H. albiflos* Jacq. Type: as for *H. albiflos* Jacq.

H. virescens Herbert var. *intermedius* Herbert, Amaryllid.: 235 (1837). Type: figure in Bot. Mag. **31**: t. 1239 (1809) (holotype).

H. intermedius (Herbert) M. Roemer, Syn. Monogr. **4**: 36 (1847).

H. leucanthus Miquel in JI Bot. Néerl. **1**: 33 (1861). Type: South Africa, Cape Province, cultivated in Hort. Bot. Utrecht, probably lost.

H. albomaculatus Baker in Gard. Chron. N.S. **10**: 202 (1878), Handb. Amaryllid.: 69 (1888) and in Flora Cap. **6**: 235. Type: South Africa, ex hort. Henderson s.n. (K, holotype).

H. albiflos Jacq. var. *pubescens* (L.f.) Baker sensu Baker (non L.f.), Handb. Amaryllid.: 68 (1888) and in Flora Cap. **6**: 235 (1896). Type: as for *H. pubescens* L.f.

H. albiflos Jacq. var. *burchellii* Baker, Handb. Amaryllid.: 68 (1888) and in Flora Cap. **6**: 235 (1896). Type: South Africa, Graaff Reinet, between Milk River and Platte River, *Burchell* 2955 (K, lectotype, Friis & Nordal, 1976). Syntype: South Africa, Uitenhage, *Zeyher* 967 (BM, K).

H. albiflos Jacq. var. *brachyphyllus* Baker, Handb. Amaryllid.: 68 (1888) and in Flora Cap. **6**: 235 (1896). Type: South Africa, Commadagga, Somerset division, *Burchell* s.n. (K, lectotype, Friis & Nordal, 1976).

Diacles pubescens (L.f.) Salisb. ex Baker sensu Baker (non L.f.), Handb. Amaryllid.: 68 (1888) and in Flora Cap. **6**: 235 (1896), in synonymy only, combination not made by Salisbury. Type: as for *H. pubescens* L.f.

H. ciliaris Salisb., Gen.: 130 (1866), nom. nud.

Bulb solitary or in clumps, ovoid, round in cross section or medianly compressed, up to 80 mm across; tunics more or less equal, with horizontal margins, turning green when exposed to light; outermost parts sometimes dark brown and papery. *Leaves* 2, 4, or 6, erect, recurved or flat on the ground, with the 2 most recent leaves appearing before the inflorescence; blade oblong, lingulate or elliptic, (40–)90–400(–500) mm long, 25–115 mm wide near the middle, flat or channelled; both surfaces light green, immaculate or sometimes with white spots, glabrous or occasionally pubescent, sometimes only on the abaxial or adaxial surface; margin densely to sparsely ciliate, or rarely smooth; apex obtuse or acute. *Peduncle* stout or slender, erect or deflexed, 50–350 mm long, 5–14 mm across greatest diam., green, immaculate, glabrous or pubescent. *Umbel* compact, narrowly obconical to obovoid, 25–70 mm across. *Spathe valves* 4–8, erect but standing somewhat

apart, shorter or slightly longer than the flowers, oblong to broadly ovate, 18–40 mm long, 6–30 mm broad, white with green veins, stiff but not fleshy; margin fringed with retrorse hairs, rarely smooth; tips obtuse to acute. *Flowers* 25–50, white. *Pedicels* 1–10 mm long, green. *Perianth* 16–23 mm long; tube 4–7 mm long, usually slightly swollen at the middle; segments standing slightly apart, oblong, 10–18 mm long, 1–2.5 mm broad; tips acute to obtuse. *Filaments* exerted by up to 9 mm, white. *Anthers* 1–2 mm long when open, yellow to orange. *Ovary* subglobose, 2–3 mm diam., green. *Style* as long as the filaments. *Berries* ovoid, about 10 mm diam., pulpy, white, orange or red. *Seeds* ovoid, about 5 mm diam., white.

Flowering time: January to October with the peak between April and August.

Leafing period: leaves present all year.

Distribution and habitat: widespread along the eastern coastal belt from Still Bay in the southern Cape, to Zululand in the north, extending inland as far as Graaff-Reinet and Queenstown in the eastern Cape. Populations favour loose loamy soils and shady conditions in forest and thornveld along the coast and valley bushveld and false karroid broken veld further inland. The rainfall in the area is spread throughout the year, varying from approximately 500 mm in the south to 1 100 mm in the north (Fig. 20).

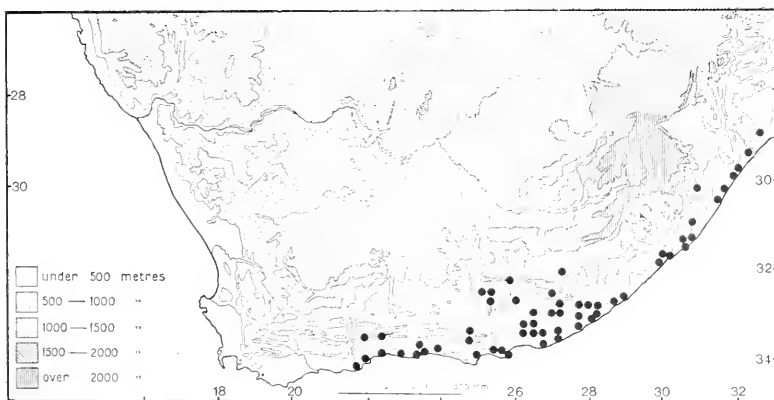


FIG. 20.
Distribution of *H. albiflos* Jacq.

Haemanthus albiflos is one of only two species of *Haemanthus* which are evergreen, the other, *H. deformis*, being closely related. The even bulb tunics characteristically turn green when exposed to light. The inflorescence is

distinguished by 4–8 white spathe valves usually with green veins and hairs on the margins. The spathe valves are erect but stand slightly apart, leaving the flowers somewhat exposed. The current season's leaves appear in advance of the inflorescence.

The number, size and vesture of the leaves varies considerably throughout the distribution range. In Natal and adjacent regions the leaves usually persist for 2 or 3 years, so that each bulb has 4 to 6 leaves. They are sub-erect or recurved, oblong and glabrous. Only the margin is pubescent either fringed with several rows of hairs or only a few scattered hairs towards the apex.

In the more open veld of the southern and eastern Cape, the leaves do not persist as long and each bulb has only 2 to 4 leaves. The leaves are either prostrate or recurved, usually lingulate, and show considerable variation in the degree of pubescence. Populations on the coast between Mossel Bay and Port Alfred, and inland around Grahamstown, Graaff-Reinet and Fort Beaufort, are particularly variable. Local races have been seen with leaves densely pubescent on both surfaces, or with either the abaxial or adaxial surface entirely or partially pubescent, or with both surfaces glabrous and only the margin ciliate. Baker (1888) described these races as distinct varieties. Recent collections have shown however, that the entire range, from hairy to glabrous forms, exists within a very small area. Baker's varieties are consequently no longer upheld.

A further element of variability within the species is the presence or absence of white spots on the leaves. Some specimens gathered between Port St Johns and Durban, and at Ngoye Forest in Natal, have leaves flecked with white spots. Prior to Friis & Nordal's review in 1976, these were referred to as *H. albomaculatus*. Bulbs from Durban (NBG 517/66) in cultivation at Kirstenbosch, have retained the spotting for more than fifteen years. The occurrence of this character within populations appears to be sporadic and is given no formal recognition.

Friis & Nordal (1976) included *H. deformis*, *H. baurii* and *H. mackenii* in their *H. albiflos* complex. These names apply to plants I regard as amply distinct from *H. albiflos*, the earliest synonym being *H. deformis*. They differ from *H. albiflos*, in having spathe valves which overlap each other closely and completely surround the flowers. The peduncle, which arises between the previous season's leaves, is greatly compressed and consistently short (less than 60 mm long). Furthermore, the newest leaves appear only after the inflorescence; they are characteristically broad and flat, 70–250 mm wide, oblong in shape and extremely thick and fleshy.

In several publications the species was incorrectly identified with *H. pubescens* (Ker Gawler 1813, 1819, 1826). This error appears to have resulted from the comparison of a hairy-leaved specimen of *H. albiflos* with a sterile

specimen of *H. pubescens* in the Banks' herbarium (*Masson s.n.*, BM). Examination of the type of *H. pubescens* (Herb. Thunb. 7927, UPS) which has both vegetative and floral parts, leaves no doubt that Ker Gawler's use of the name was incorrect.

NATAL—2831 (Nkandla): Hluhluwe Game Reserve (-BB), *Ward 2347* (PRE); Hlabisa, *Feely & Ward 38* (K, PRE), *Harrison s.n.* (K, PRE); Ngoye Forest (-DC), *NBG Expedition 268/76* (NBG), *Ross 2125* (K, PRE).

—2930 (Pietermaritzburg): Pietermaritzburg (-CB), *Carnegie* sub NBG 209/30 (NBG); Krantzklouf Nature Reserve (-DD), *Moll 3316* (PRE); Isipingo, *Forbes & Obermeyer 53* (PRE).

—2931 (Stanger): Tugela River Bridge (-AB), *Pole Evans s.n.* (PRE 36934); Umhlali (-AD), *Meeuse s.n.* (PRE); Mount Moreland (-CA), *Wood 1006* (K); Salisbury Island (-CC), *Galpin 11865* (PRE); Near Durban, *Wood 1989* (K), *Wood 496* (BM, SAM), *Thorpe* sub NBG 102/37 (NBG), *Warren ex Thorns* sub NBG 517/66 (NBG); Happy Valley, Durban, *Huntley 20* (MO).

—3030 (Port Shepstone): Ifafa (-AD), *Rudatis 665* (BM, PRE), *Rudatis 669* (E, K); Umbogintwini (-BB), *Begley s.n.* (PRE 36921); Nongwana Falls, *Begley s.n.* (PRE 39397); Isipingo Beach, *Gouws* sub NBG 535/64 (NBG), *Ward 914* (PRE), *Warner 914* (PRE); Warner Beach, *Strey 8803* (PRE); 11 km south of Umtamvuna bridge (-CC), *Roux 90* (NBG); Margate coast (-CD), *Cohen s.n.* (NBG).

—3130 (Port Edward): Umtamvuna Forest Reserve (-AA), *Strey 9884* (PRE).

CAPE—3126 (Queenstown): Finchams Nek (-DD), *Galpin 1886* (BOL, GRA, K, PRE).

—3129 (Port St. Johns): Magwa Falls (-BC), *Strey 6719* (PRE); Msikabariviermond (-BD), *Venter 1037* (PRE); Near Port St. Johns (-DA), *Prance s.n.* (NBG), *Bayliss BS7067* (K, MO).

—3224 (Graaff-Reinet): Graaff-Reinet (-BC), *Bolus 85* (BOL, K), *Sister Francis 53* (BOL); Between Milk River and Platte River, Graaff-Reinet (-BD), *Burchell 2955* (K); Farm Wheatlands, Kendrew (-DB), *Parkes s.n.* (NBG).

—3225 (Somerset East): Cradock (-AB), *Muller 696* (PRE), *Rogers s.n.* (MO); Somerset East (-DA), *Marloth 7033* (PRE).

—3226 (Fort Beaufort): Katberg Pass (-BC), *Hardick 42* (MO, NBG); Just north of farm La Motte (-CC), *Snijman 475* (NBG, PRE); Brambledene, Menziesberg (-DB), *Acoks 1114* (K, PRE); Hogsback Forest Reserve, *Dahlstrand 2935* (GRA, STE); 56 km from Grahamstown towards Fort Beaufort, via Fort Brown (-DC), *Snijman 477* (NBG); Sandile's Kop (-DD), *Giffen s.n.* (PRE).

—3227 (Stutterheim): Pirie Forest (-CB), *Martin* sub NBG 393/38 (NBG); Mount Coke (-CD), *Compton 17005* (NBG); Kingwilliamstown, *Sim 1846* (PRE); Kei Road (-DA), *Comins 1551* (PRE); Near Komgha (-DB), *Flanagan 1297* (PRE, SAM); Nahoon Valley (-DD), *Pamphlett 23* (NBG); Bonza Bay, *Nichol s.n.* (NBG).

—3228 (Butterworth): Mazeppa Bay, Transkei (-BD), *Godfrey s.n.* (BOL); Qoloka Mouth (-CB), *NBG Expedition 334/73* (NBG); Kentani, *Pegler 852* (BOL); Kei Mouth, *Roux 540* (NBG).

—3321 (Ladismith): Huis River Gorge (-DA), *Bruyns 2223* (NBG).

—3322 (Oudtshoorn): Oudtshoorn (-CA), *Deas* sub NBG 221/15 (BOL); Groenkop, Swarttrivier (-DC), *van Daalen 162* (PRE).

—3323 (Willowmore): Deepwalls, Knysna (-CC), *Phillips 18443* (BOL); Witelsriver, Tsitsikamma Coastal National Park (-DC), *Roux 307* (MO, NBG, PRE); Helpme-kaar River, *Roux 309* (NBG).

—3324 (Steytlerville): Farm Marzyl, north east of Steytlerville (-AD), *Paterson s.n.* (NBG); Enkeldoorn track, Baviaanskloof (-CB), *Snijman 330* (NBG).

—3325 (Port Elizabeth): Commadagga (-BB), *Burchell 3348* (K), *Snijman 467* (PRE), *Snijman 468* (NBG); Suurberg Pass (-BD), *Snijman 486* (NBG); Van Staden's Nature Reserve (-CC), *Dahlstrand 3191* (PRE); Uitenhage (-CD), *Zeyher 967* (BM, K); Fairview Golf Course, Port Elizabeth (-DC), *Long 963* (GRA, K, PRE); Redhouse, *Paterson 673a* (GRA).

—3326 (Grahamstown): Riet River, Grahamstown (-AA), *White 44* (GRA, SAM); Alicedale (-AC), *Cruden 223* (GRA); 15 miles south of Grahamstown (-AD), *Stayner s.n.* (NBG); Coldspring, *Glass 523* (GRA); Hopewell, Bathurst (-BD), *Acocoks 18380* (PRE); Alexandria (-CB), *Galpin 10796* (PRE); Port Alfred (-DB), *Tyson 17546* (PRE), *Tyson s.n.* (GRA, PRE), *Becker s.n.* (GRA), *Henry s.n.* (GRA, PRE); Near Kowie, *Tyson s.n.* (BOL).

—3327 (Pieddie): Ebb-and-Flow (-AB), *Comins 1507* (PRE); East London (-BB), *Bokelmann s.n.* (NBG), *Carter sub NBG 91/30* (NBG), *Barker sub NBG 1109/35* (NBG).

—3421 (Riversdale): 3,5 km north of Stillbay (-AD), *Burgers 2162* (NBG); Kaffir Kuils River near mouth, *Muir 186* (BOL, PRE); Albertinia (-BA), *Muir 2162* (PRE).

—3422 (Mossel Bay): West of Great Brak, 0,5 km north of national road (-AA), *Bayer s.n.* (NBG).

—3423 (Knysna): Knysna (-AA), *Denman 36* (NBG); Plettenberg Bay (-AB), *van Jaarsveld 3275* (NBG), *van Niekerk s.n.* (BOL 26233).

—3424 (Humansdorp): Kabeljous (-BB), *Fourcade 3352* (STE).

—3425 (Skoenmakerskop): Sea View, south west of Port Elizabeth (-AB), *Snijman 499* (NBG).

Inexact localities: Zwischen Pietermaritzburg und Greytown, *Wilms 2323* (BM, K); Ifafatal, *Rudatis 1426* (BM, E, K); Natal, *Wood 1935* (E); Besters Hoek near Somerset East, *Scott Elliot 501* (E); Pondoland, *Bachmann 293* (K); Cape, *Villee s.n.* (K); South Africa, *Ecklon & Zeyher s.n.* (MO).

10. *Haemanthus deformis* Hook.f. in Bot. Mag. **97** t. 5903 (1871); Baker, Handb. Amaryllid.: 69 (1888) and in Flora Cap. **6**: 236 (1896). Type: South Africa, Natal, table 5903 in Bot. Mag. **97** (1871) (lectotype, here designated), specimen *McKen s.n.* probably lost (Friis & Nordal, 1976). **Plate 9.**

H. baurii Baker in Gard. Chron. **24** N.S.: 813 (1885); in Bot. Mag. **112**: t. 6875 (1886); Handb. Amaryllid.: 69 (1888) and in Flora Cap. **6**: 236 (1896). Type: South Africa, Griqualand East, Shawbury, close to Tsitsa Falls, *Baur 231* (K, lectotype, designated by Friis & Nordal, 1976).

H. mackenii Baker, Hand. Amaryllid.: 69 (1888) and in Flora Cap. **6**: 237 (1896). Type: South Africa, Natal, illustration of a plant received originally from McKen and which flowered for Mr. Bull in Nov. 1870 (K, lectotype, here designated), specimen probably lost (Friis & Nordal, 1976).

Bulb solitary or in clumps, ovoid, medianly compressed, up to 100 mm across; tunics thick, more or less equal, with horizontal margins, turning green when exposed to light. *Leaves* 2 or 4, strongly recurved, persisting for

PLATE 9.

H. deformis Hook. f. (*Perry 1719*, near Hela-Hela), all parts life-size.



Edward H.
1982

HABITAT: THUS, ECTOPHYTES
HOOK, F.

more than a year, the two older leaves present with the inflorescence, the most recent leaves appearing shortly after; blade broadly oblong, more or less as long as broad or sometimes broader than long, 80–260 mm long, 70–250 mm broad, thick and flat; both surfaces immaculate, entirely glabrous or densely pubescent on the adaxial or abaxial surface; margin ciliate; apex blunt. *Peduncle* arising between the leaves of previous season, short, less than 60 mm long, greatly compressed, 6–15 mm across greatest diam., green, smooth or pubescent. *Umbel* compact cyathiform, somewhat compressed, 45–70 mm across. *Spathe* valves 6–7, erect and overlapping, as long as the flowers, slightly recurved at the tips, oblong to somewhat spatulate, 30–60 mm long, 12–45 mm broad near the apex, white, sometimes with slight green veining, firm but not fleshy; margins ciliate; tips obtuse. *Flowers* 25–45, white. *Pedicels* short, 1–7 mm long, green. *Perianth* 30–31 mm long; tube 7.5–9 mm long, more or less cylindrical; segments erect, oblong, 21–23.5 mm long, 1–2 mm broad; tips subacute to obtuse. *Filaments* exerted by up to 10 mm, white. *Anthers* about 2 mm long when open, golden yellow. *Ovary* subglobose, 2.5–3 mm diam., green. *Style* as long as the stamens. *Berries* ovoid, about 15 mm diam., soft and pulpy, orange to red. *Seeds* ovoid, about 5 mm diam.

Flowering time: May to October.

Leafing period: evergreen.

Distribution and habitat: found in localised populations in the midland and coastal areas of Natal as well as the Transkei, at altitudes from 300 to 1 000 m above sea level. Populations are found in sheltered sites under bushes or on moist rocky banks (Fig. 21).



FIG. 21.
Distribution of *H. deformis* Hook. f.

Haemanthus deformis, together with its close ally *H. albiflos*, are the only evergreen species in the genus. The habit of *H. deformis* is most unusual, contributing no doubt to J. D. Hooker's choice of epithet. Unlike any other species the inflorescence appears between the persistent leaves of the previous season. The peduncle remains short, less than 60 mm long, while the flowers are closely surrounded by 6–7 broad white spathe valves, which may or may not have green veins. The current season's leaves appear only after the inflorescence, in a position lateral to the peduncle. The leaf blades are broadly oblong (70–25 mm wide), more or less as long as broad, with the texture very thick and fleshy.

Friis & Nordal (1976) included *H. deformis* in their *H. albiflos* complex, on the assumption that specimens bearing this name were merely depauperate forms of *H. albiflos*. Mature bulbs in cultivation at Kirstenbosch certainly cannot be regarded as such. Their habit has remained constant over many years, the peduncle lengthens somewhat during the fruiting stage but is consistently short while flowering.

Considerable variability is found in the pubescence of the plants. The leaves and peduncles range from entirely smooth to densely hairy, but from the limited material available at present, no clear trends are evident.

Bulbs were sent to the Royal Botanic Gardens, Kew, as early as 1869, by M. J. McKen of the Botanic Garden Durban, and a few years later by the Rev. L. R. Baur, from the Transkei. Both collectors are commemorated in the names *H. mackenii* and *H. baurii*, placed here into synonymy with *H. deformis*.

NATAL—2930 (Pietermaritzburg): 2 miles east north east of Bayne's Drift (-BC), *Acocks 13775* (PRE); Noodsberg, Appelbos (-BD), *Strey 6029* (PRE); Near Hela Hela along road from Ulufafa (-CC), *Perry 1719* (NBG); Mariannhill (-DD), *Marloth 7413* (PRE).

—3030 (Port Shepstone): Kunata, 7 miles east of Highflats (-AC), *Strey 4416* (PRE); 5 km west of Umzumbi (-CB), *van Jaarsveld 5733* (NBG); Gundrift (-CC), *Strey 8709* (K, PRE).

CAPE—3028 (Matatiele): Mount Frere (-DD), *Sim 1845* (PRE).

—3128 (Umtata): Shawbury, close to Tsitsa Falls (-BB/-BD), *Baur 231* (K).

Dubious locality: Nama'land, Richtersveld, *SUG 3700* (BOL).

11. *Haemanthus sanguineus* Jacq., Hort. Schoenbr. 4: t. 407 (1804); Herbert, Amaryllid.: 255 pl. 31 fig. 5 (1837); Baker, Handb. Amaryllid.: 71 (1888) and in Flora Cap. 6: 238 (1896). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 4: t. 407 (1804) (lectotype, Friis & Nordal, 1976). **Plate 10.**

Melicho sanguineus (Jacq.) Salisb. ex Baker, Handb. Amaryllid.: 71 (1888), in synonymy only, combination not made by Salisbury.

Haemanthus rotundifolius Ker Gawler in Bot. Mag. 39: t. 1618 (1814);

Herbert, Amaryllid.: 235 pl. 31 fig. 8 (1837); Baker, Handb. Amaryllid.: 70 (1888) and in Flora Cap. 6: 239 (1896); Friis & Nordal in Norw. J. Bot. 23: 68 (1976). Type: South Africa, Cape of Good Hope, figure in Bot. Mag. 39: t. 1618 (1814) (lectotype, Friis & Nordal, 1976).

H. lambertianus Schultes in Syst. Veg. 7 (2): 891 (1830). Type: South Africa, *Lambert s.n.* in herb. Martius (BR, lectotype, designated by Friis & Nordal, 1976, not seen).

H. rotundifolius Ker Gawler var. *multivalvis* Herbert, Amaryllid.: 235 (1837). Type: as for *Haemanthus lambertianus* Schultes (lectotype, here designated); South Africa, Cape Province, *Burchell* bulb No. 129 (K, syntype) = *H. coccineus* L.

H. incarnatus Burchell ex Herbert, Amaryllid.: 237 pl. 31 fig. 1 (1837); Baker, Handb. Amaryllid.: 70 (1888) and in Flora Cap. 6: 328 (1896). Type: South Africa, Cape Province, *Krakakamma, Burchell 4556* in herb. Hookerianum 1867; inflorescence (26/8/1818) in top left corner and two leaves (18/5/1819) on right side of sheet here selected as lectotype (K).

H. cooperi Baker, Handb. Amaryllid.: 70 (1888); Baker in Flora Cap. 6: 237 (1896). Type: South Africa, Cape of Good Hope, sketch of a plant from Cooper which flowered at Kew in 1863 (K, holotype).

Bulb solitary, small to very large, narrowly to broadly ovoid, laterally compressed, 40–100 mm across; tunics thick, imbricate, distichous, cream-coloured; the margins oblique, light to dark brown. *Leaves* 2, prostrate or adpressed to the ground, appearing after the inflorescence; blade broadly to narrowly elliptical to oblong or rotund, broader than long, as broad as long or occasionally much longer than broad, 90–400 mm long, 35–280 mm wide, flat, thick and leathery; adaxial surface dark dull green, rough, with minute asperities, rarely smooth; abaxial surface light green, shiny and smooth, immaculate or sometimes slightly spotted with red towards the base; margin cartilaginous, red or hyaline, smooth or with retrorse branched cilia, occasionally only towards the apex; apex obtuse. *Peduncle* stout or slender, up to 270 mm long, 7–27 mm across the greatest diam., usually furrowed and considerably compressed towards the apex, varying from bright red to deep wine-red or pink, immaculate, glabrous. *Umbel* medianly compressed, narrowly to widely cyathiform or occasionally lax and somewhat spreading, 30–80 mm across. *Spathe valves* 5–11, erect but standing apart, sometimes slightly spreading, shorter than or as long as the flowers, narrowly to broadly oblong-lanceolate or ovate, 20–70 mm long, 7–50 mm broad, the

PLATE 10.

H. sanguineus Jacq. (*Snijman 656*, Kirstenbosch estate) 1 inflorescence \times 1; 2 flower \times 1; 3 spathe valves \times 1; 4 bulb \times 0.5; 5 portion of leaf \times 0.5.



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lateral spathe valves mostly keeled and falcate, red to wine-red or pink, thin-textured, becoming striate with age; tips obtuse to acute. *Flowers* (15–)25–150, varying from bright red to salmon or pale pink, sometimes with white on the tube and segment tips. *Pedicels* 8–35 mm long, whitish to pink or red. *Perianth* 15–32 mm long; tube 2–9 mm long, widening gradually upwards; segments erect but standing slightly apart from the base, oblong to lanceolate, 10–24 mm long, 1–4 mm wide; tips acute. *Filaments* exerted by up to 10 mm, pink to red with white tips. *Anthers* 1–4 mm long when open, yellow. *Ovary* subglobose, about 2–3 mm diam., pink to red. *Style* more or less as long as the stamens. *Berries* subglobose to irregularly ovoid, about 15–20 mm diam., either cream with a pink blush or deep red to wine-red, becoming soft and translucent. *Seeds* ovoid, 5–8 mm diam., dark wine-red.

Flowering time: January to April.

Leafing period: from April until November.

Distribution and habitat: widespread throughout the south western and southern Cape, from the Nardouwsberge and Pakhuisberge in the west to the Port Elizabeth district in the east. The species is found over a wide altitudinal range, from sea level to mountain peaks of 1 200 m, with annual rainfall varying from 450 mm along the drier south west coast to 1 400 mm on some of the higher mountain ranges. The associated vegetation is mostly renosterveld or fynbos, on either clay or sandy soils. Populations are very localised and usually small, of up to twenty individuals. Flat open terrain is the most favoured habitat, but in the mountains around Worcester and Ceres, populations are also found in kloofs on steep, shaded slopes (Fig. 22).

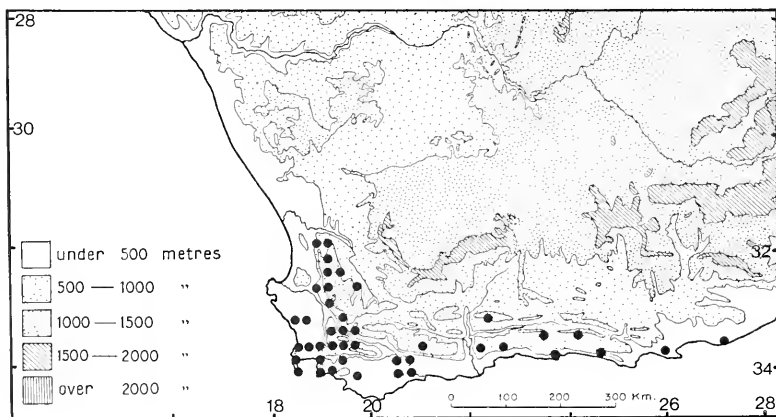


FIG. 22.
Distribution of *H. sanguineus* Jacq.

The diagnostic features of *H. sanguineus* are as follows. The peduncle is unmarked, often compressed and furrowed. The 5–11, thin-textured spathe valves are erect to slightly spreading, while those situated laterally are keeled and falcate. The perianth segments spread apart slightly from the base. The leaves are either prostrate or adpressed to the ground. They are characteristically leathery, mostly rough and dark green on the adaxial surface. The margin is cartilaginous, red to opaque and either smooth or denticulate. The bulb is flattened laterally with imbricate, distichous tunics.

Field observation has shown that *H. sanguineus* is an extremely polymorphic species. The present circumscription incorporates several ecological races, centred mostly in the mountains and valleys of the Worcester district. The great diversity in size of floral and vegetative parts, as well as the many subtle differences in flower colour between populations, makes it difficult to subdivide the species into infraspecific taxa.

The most notable variants throughout the range are as follows. Coastal populations have adpressed leaves, mostly wider than they are long. The umbels are compact and compressed and the flowers mostly exceed the spathe valves, giving the umbel a typical paintbrush-like appearance. Colours of the floral parts vary from light red to wine-red.

In the Du Toits Kloof and Bains Kloof mountains, populations occur both on high, sunny plateaux, as well as on steep, moist, shaded slopes. Specimens from the plateaux are very like those found in the coastal areas except that they are mostly smaller in size and have umbels which are more lax and brilliant red in colour. Populations extending down the slopes however, show extreme plasticity. This is particularly evident in specimens collected from the precipitous banks of the Krom River; *Esterhuysen 25436* (BOL, PRE), as well as *Viviers 58* (NBG) and *Snijman 95* (NBG). These collections have leaves much longer than they are wide, almost ligulate in shape and loosely recurved. The umbels are extremely lax, with loose spreading flowers and spathe valves; and the perianths have particularly broad segments (3–4 mm wide).

In the sandveld near Malmesbury and Darling, and the sandy Breede River flats between Worcester and Swellendam, there are populations which differ in having pale inflorescences. The leaves are broad and prostrate, showing no difference from other lowland specimens of *H. sanguineus*, but the peduncles and spathe valves are deep to pale pink, with even lighter pink flowers. In addition the perianths are generally smaller with short tubes (2–4 mm long) and narrow segments (1–2 mm wide).

In the east of the distribution range, from Oudtshoorn to Port Elizabeth, *H. sanguineus* is easily confused in the flowering stage with *H. coccineus*, the only other red-flowered species in this area. Here the differences between the two species are not as pronounced as elsewhere, since the umbels

of *H. coccineus* in this region are somewhat lax. The vegetative parts nevertheless distinguish the species, the leaves of *H. sanguineus* being rough and leathery, whereas those of *H. coccineus* are smooth and fleshy.

Formerly the species was known as *H. rotundifolius* in the south western Cape and as *H. incarnatus* in the eastern Cape. The type of the earliest name, *H. sanguineus*, is not the most typical representative of the species but matches the less common forms of the species from cool, shady habitats. Due consideration must be given to the fact that the bulbs, from which the lectotype of *H. sanguineus* was drawn, were cultivated at the Schönbrunn gardens in Vienna; in all probability, under conditions of very low light intensity. Understandably, the leaves and umbels would have been more lax and slightly atypical of the bulbs' usual growth habit.

Herbert's variety, *H. rotundifolius* var. *multivalvis*, is very like some forms of *H. sanguineus*, with robust inflorescences and many spathe valves, from the Ceres district (*Bayer s.n.*, NBG). Herbert (1837), based this taxon on the mixed elements *H. lambertianus* and *H. callosus*. The description of *H. lambertianus* corresponds well with Herbert's concept of *H. rotundifolius* var. *multivalvis*, whereas Burchell's specimen (bulb No. 129, K), bearing the then unpublished name *H. callosus*, falls outside the limits of *H. rotundifolius*. The lectotype of *H. rotundifolius* var. *multivalvis* is thus taken as that of *H. lambertianus* and both taxa are placed into synonymy under *H. sanguineus*. The identity of *Haemanthus callosus* is discussed fully under *H. coccineus*.

CAPE—3218 (Clanwilliam): Pakhuis Pass (-BB), *Barker 4706* (NBG); Clanwilliam, without collector NBG 2904/14 (BOL); De Hoek, Piquetberg division (-DD), *Lewis 2378* (SAM).

—3219 (Wuppertal): Top of Pakhuis Pass (-AA), *Snijman 433* (B, NBG), *Lewis 2385* (SAM); Cedarhout Kloof, southern Cedarberg (-AC), *Esterhuysen 20041* (BOL); Hexberg, Cold Bokkeveld mountains (-CA), *Esterhuysen 18439* (BOL); Skoongesig, Bokfontein, Ceres (-CB), *Hanekom 1781* (PRE); Top of Dasklip Pass (-CC), *Loubser 2102* (NBG); New Elands Kloof Pass (-DC), *Thorns* sub NBG 141/47 (NBG), *Bayer s.n.* (NBG).

—3318 (Cape Town): Tinie Versfeld Nature Reserve, Darling (-AD), *Snijman 108* (NBG); Farm Swartwater, near Darling, *Rourke 1209* (NBG), *Snijman 109* (K, MO, NBG, PRE); 4 miles north of Malmesbury (-BC), *Barker 4495* (NBG); Kirstenbosch estate (-CD), *Snijman 91* (NBG), *Snijman 656* (NBG); Wynberg Hill, *Pillans 10600* (MO); Signal Hill, *Guthrie 16946* (BOL); Cecilia Gorge, *Esterhuysen 12641* (BOL); Table Mountain, *Schonnberg* in herb. *Galpin 4966* (PRE), *Moyle Rogers s.n.* (BM), ex Legato *Alexander Prior* (K); Cape Town, ex herb. *Worsdell s.n.* (Kd); Camps Bay, herb. *Maude s.n.* (BM); Kanonkop, Tygerberg (-DC), *Rourke 1665* (NBG); Simonsberg foothills (-DD), *Richfield s.n.* (NBG); Southern foothills of Simonsberg, *Snijman 195* (B, K, NBG, PRE); Schoongezicht farm, *Snijman 197* (NBG, PRE), *Snijman 198* (NBG); Stellenbosch, *Duthie 1448* (BOL), *Garside 454* (K), *van Rensburg 1963* (K).

—3319 (Worcester): Great Winterhoek (-AA), *Compton 4614* (BOL), *Galpin 12589*

- (PRE); Ceres (-AD), *Herre* sub SUG 12921 (BOL); Hawequas mountains (-CA), *D'Ewes s.n.* (NBG, PRE), *Oliver* 3734 (STE); Du Toits Kloof, *Snijman* 95 (NBG), *NBG Expedition* sub NBG 511/70 (NBG), *Esterhuysen* 20177 (BOL), *Drège* 1840 (K); Krom River Kloof off Du Toits Kloof, *Esterhuysen* 25436 (BOL, PRE), *Viviers* 58 (NBG); Breede River flats, near Rawsonville (-CB), *Perry* 1284 (NBG); French Hoek (-CC), *Ridley* sub NBG 3903/15 (BOL), *Schlechter* in herb. Austro-Africanæ 10264 (BM, BOL, E, GRA, K, MO, PRE); Felix Berg, *Esterhuysen* 7737 (BOL); April Peak, Wemmershoek mountains, *Esterhuysen* 16822 (BOL); Klein Drakenstein mountains, *Galpin s.n.* (BOL); Villiersdorp (-CD), *van Breda s.n.* (PRE 36958); Moddergat, *Perry* 715 (NBG); Upper White River on Keerom mountain (-DA), *Gillett* 819 (STE); Jonas Kop (-DC), *Snijman* 81 (NBG); At turnoff to Eilandia, from Worcester/Robertson road, *Snijman* 210 (NBG, PRE), *Snijman* 392 (K, NBG); Just south east of Silver Oaks farm along Robertson/MacGregor road, *Snijman* 211 (NBG), *Snijman* 393 (K, NBG, PRE); 1.6 km along Eilandia road from Worcester/Villiersdorp road, *Snijman* 408 (MO, NBG, PRE).
- 3320 (Montagu): Southern slopes at foot of Langeberge, near Heidelberg (-DD), *Esterhuysen* 14462 (BOL).
- 3321 (Ladismith): Farm Droogkraal south of Potgieterspoort (-BD), *Snijman* 404 (NBG, PRE); Attakwaskloof (-DD), *Nichols* 399 (NBG).
- 3322 (Oudtshoorn): George, edge of Witfontein Forest Reserve (-CD), *Moriarty* 321 (NBG); Herold, north of Outeniqua mountains, *Vlok* 385 (NBG).
- 3323 (Willowmore): Pass between Avontuur and Uniondale (-CA), *Fourcade* 2927 (K); Nuwekloof, north west entrance to Baviaanskloof (-DA), *Snijman* 354 (NBG, PRE), *Snijman* 398 (NBG), *Müller-Doblies* 79067A (NBG).
- 3325 (Port Elizabeth): Parsons' Vlei (-CD), *Long* 542 (K, PRE), *Long* 534 (K), *Long* 604 (K); Krakakamma, *Burchell* 4556 (K); Redhouse (-DC), *Paterson* 489 (BOL, K), *Paterson* sub NBG 603/14 (BOL), *Snijman* 495 (NBG).
- 3418 (Simonstown): Duiker Point, west side of Karbonkelberg (-AB), *Leighton s.n.* (BOL); Bergvliet farm, *Purcell* 205 (SAM), *Purcell* 210 (SAM); Hills west of Simonstown, ex herb. Wolley-Dod 1162 (K); Slangkop, Kommetjie, *Moriarty s.n.* (NBG); Noordhoek, *Cullett* 5557 (K); Vasco da Gama Peak, Cape Point (-AD), *Compton* 15533 (NBG); Near Somerset Strand (-BB), *Nel* 1438 (STE); Faure siding, *Garside* 453 (K); Palmiet River mouth (-BD), *Boucher* 1130 (PRE, STE); Betty's Bay, *Snijman* 93 (NBG).
- 3419 (Caledon): Kleinmond (-AC), *Rourke* 1189 (NBG); About 1 km before farm Avontuur on Albertyn/Caledon road, *Snijman* 87a (NBG); Drayton siding (-BA), *Strauss* 94 (NBG); Near Dirkuyskraal between Viljoenshot and Buffelsjachtbaai (-DA), *Snijman* 385 (NBG).
- 3420 (Bredasdorp): Swellendam (-AB), *Thode* A2399 (K, PRE); Bontebok Park, *Liebenberg* 7975 (K, PRE); Southern bank of Breede River, *Stayner* sub KG 71/73 (NBG); Near entrance to Bontebok Park (-AB/-BA), *Rourke* 1697 (B, K, NBG); De Hoop Nature Reserve, Windhoek (-AD), *Thompson* 3466 (STE); Wydgelee (-BC), *Rourke* 1694 (K, NBG, PRE).
- 3423 (Knysna): Plettenberg Bay (-AB), *Goldblatt* 5473 (NBG).
- 3424 (Humansdorp): Tsitsikamma National Park, near Eerste River (-AA), *Liversidge s.n.* (NBG).

12. *Haemanthus canaliculatus* Levyns in Jl S. Afr. Bot. **32**: 75 (1966); Levyns in Veld & Flora, Collectors Editn., Cape Town: 22 (1973); Friis & Nordal in Norw. J. Bot. **23**: 67 (1976); Obermeyer in Fl. Pl. S. Afr. **46**: pl. 1803 (1980). Type: South Africa, Cape Province, marshy places above Rooi Els, fl. 27/2/1961, *Levyns* 11105 (BOL, holotype). **Plate 11.**

Bulbs in clumps, narrowly ovoid, strongly compressed laterally, up to 90 mm across; tunics thick and fleshy, imbricate, distichous, cream-coloured; margins oblique, without withered brown remains. *Leaves* 2, occasionally 1, 3 or 4, suberect to recurved, appearing after the inflorescence and sometimes persisting for 2 years; blade narrowly ligulate, 170–400 mm long, 5–27 mm wide, canaliculate, succulent and smooth; both surfaces shiny green with darker green and reddish barring towards the base, especially on the abaxial surface; apex obtuse. *Peduncle* erect or curved, compressed, up to 200 mm long, 4–10 mm across greatest diam., reddish-pink to deep red, occasionally finely spotted with deeper red towards the base, glabrous. *Umbel* loosely spreading, 30–90 mm across. *Spathe valves* 5–7, somewhat spreading, slightly shorter or longer than the flowers, narrowly to broadly lanceolate, 25–70 mm long, 6–20 mm wide, brilliant red or occasionally pink, somewhat leathery; tips acute to subacute. *Flowers* 15–45, bright red or occasionally pink. *Pedicels* 6–15 mm long, reddish. *Perianth* 20–30 mm long; tube 3–6 mm long, widening gradually upwards; segments standing slightly apart, lanceolate, 17–24 mm long, 3–4,5 mm broad; tips acute. *Filaments* exerted by up to 8 mm, red or pink. *Anthers* 1,5 mm long, yellow. *Ovary* subglobose, about 2,5 mm diam., red or pink. *Style* mostly exceeding the stamens by up to 8 mm. *Berries* somewhat globose, about 20 mm diam., reddish. *Seeds* 1–4, mostly ellipsoid, up to 10 mm across, shiny, deep wine-red.

Flowering time: February–March, or later when in cultivation.

Leafing period: May until December.

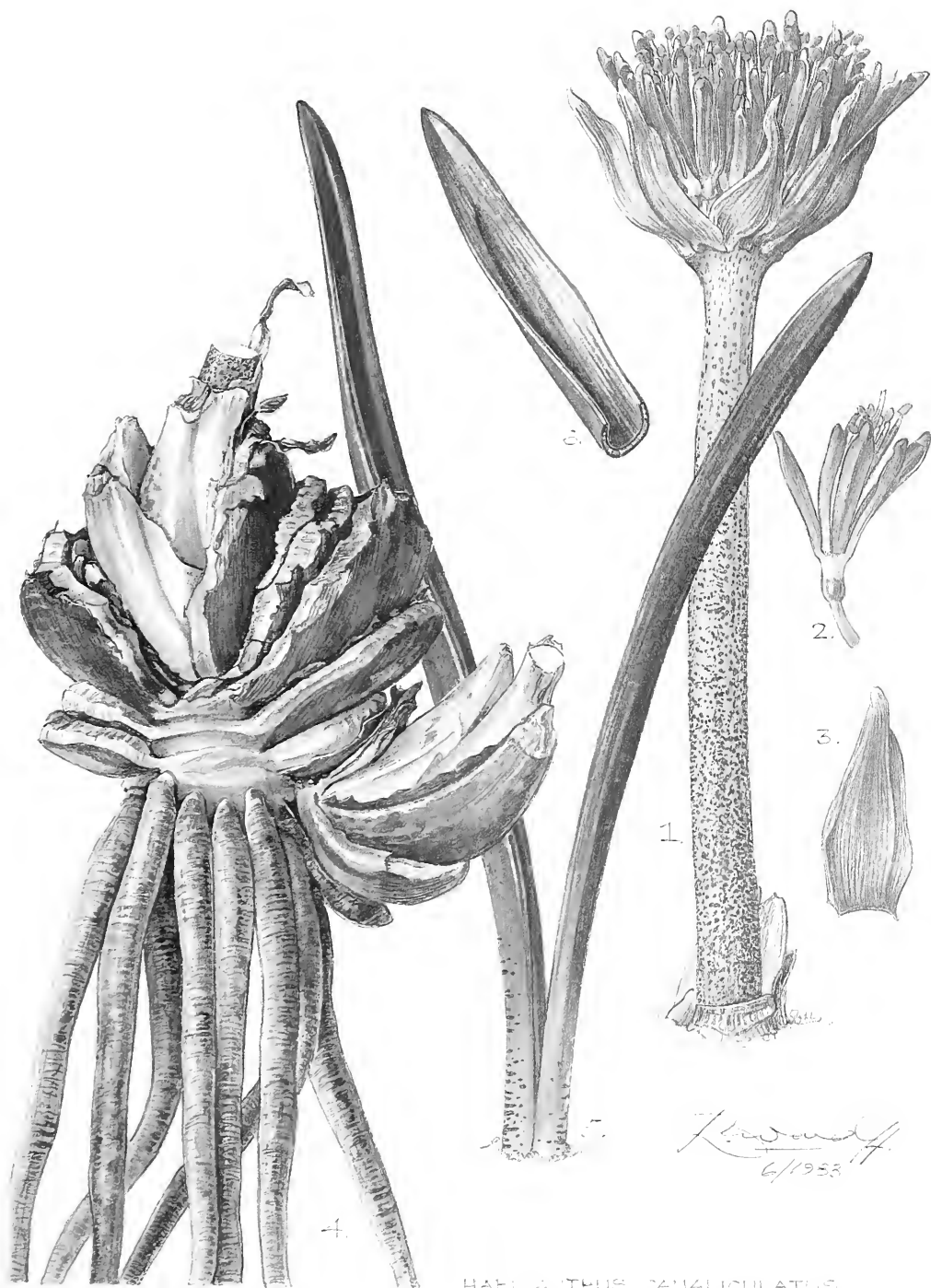
Distribution and habitat: limited to an extremely small area of the south western Cape coast between Rooi Els and Betty's Bay, at approximately 30 m above sea level, where the annual rainfall is 650 mm. Several populations are known in the area, always occurring in shallow depressions under dense bush, where the peaty soils become waterlogged in winter (Fig. 23).

Haemanthus canaliculatus is a very distinctive member of the genus. It is the only species with succulent, narrowly ligulate (5–27 mm across), canaliculate leaves with red barring near the base. The inflorescence is closest in appearance to that of *H. sanguineus* but has a very spreading umbel with 5–7 narrow acuminate spathe valves. The bulb is made up of loose, fleshy tunics with oblique, truncate margins.

The species was first collected by Mrs. M. Brunt after a fire at Betty's

PLATE 11.

H. canaliculatus Levyns (van Essen s.n., Pringle Bay) 1 inflorescence (a pale form grown at Kirstenbosch) × 1; 2 flower × 1; 3 spathe valves × 1; 4 bulb × 1; 5 leaves × 1; 6 section of leaf × 1.



K. Schumacher
6/1953

HAENLITZUS CANALICULATUS
LEWYIS

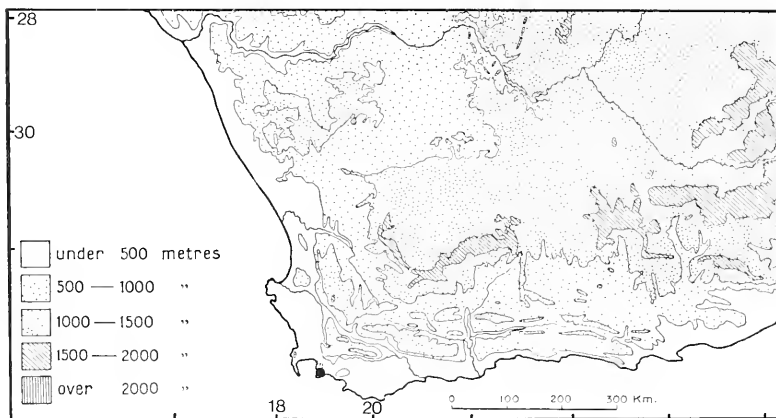


FIG. 23.
Distribution of *H. canaliculatus* Levyns

Bay in 1943 but only when another fire swept through the area in 1960 was Dr. M. R. Levyns able to gather further material and describe the species. Since then records show that summer fires have traversed the area at approximately ten-yearly intervals. The species was recorded flowering again at Betty's Bay in 1970 and at Rooi Els in 1982.

Haemanthus canaliculatus has never been known to flower in nature except after summer fires, hence the belief that fire is vital to initiate flowering (Levyns, 1973). However, since bulbs grown in lightly-shaded pots at Kirstenbosch (*van Essen s.n.*) flower regularly each year, it appears that the effect of clearing the habitat rather than fire itself causes the bulbs to flower. It is noteworthy that the sites occupied by *H. canaliculatus* have the densest cover of all the species studied; therefore the strategy of restricting flowering to times when the habitat has been cleared is a most effective means of conserving resources as well as ensuring pollination and germination in an open community.

The only other species occupying habitats in fynbos where fires frequently occur are *H. coccineus* and *H. sanguineus*, but these occupy more open stands and flower fairly regularly, although particularly good displays follow summer fires.

CAPE—3418 (Simonstown): Hangklip estate, near Rooi Els (-BD), *Levyns 11105* (BOL), *Levyns 11140* (BOL), *Levyns 11223* (BOL); Hangklip, *Lavranos 11980* (PRE); Pringle Bay, *Jackson s.n.* (NBG), *van Essen s.n.* (NBG); Betty's Bay, *Topper s.n.* (K, NBG, PRE), *Oliver 3090* (PRE), *Oliver 3092* (PRE), *Rourke 1229*

(K, MO, NBG, PRE), *Brunt* s.n. (BOL 23215, BOL 23216), *Rourke* 688 (NBG), *Porter* s.n. (NBG), *Brunt* sub NBG 110/45 (NBG).

13. ***Haemanthus pumilio*** Jacq., Hort. Schoenbr. 1: 32 t. 61 (1797); Herbert, Amaryllid.: 234 (1837); Baker, Handb. Amaryllid.: 67 (1888) and in Flora Cap. 6: 233 (1896); Duthie in Ann. Univ. Stellenbosch 6: 3 pl. 1 fig. 8 & pl. 2 fig. 1 (1928). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 1: t. 61 (1797) (lectotype, Friis & Nordal, 1976).

Plate 12.

Melicho pumilio (Jacq.) Salisb. ex Baker in Flora Cap. 6: 233 (1896), in synonymy only, combination not made by Salisbury.

Bulbs forming clumps, small, narrowly ovoid, strongly compressed laterally, up to 55 mm across; tunics fleshy, imbricate, distichous, cream-coloured; margins oblique, transparent and membranous. *Leaves* 2, sub-erect, appearing after the inflorescence; blade narrowly ligulate, 55–130 mm long, 2.5–15 mm broad, slightly channelled and twisted, fleshy, glabrous; both surfaces shiny green with red bars near the base of the abaxial surface; apex obtuse. *Peduncle* slender and somewhat compressed, 45–180 mm long, 3–6 mm across greatest diam., reddish-pink, sometimes slightly marbled, glabrous. *Umbel* lax and spreading, broadly obconical, 10–50 mm across. *Spathes* 4–6, spreading apart, shorter or as long as the flowers, narrowly triangular, 10–30 mm long, 3–10 mm wide, pale to deep pink, membranous. *Flowers* 4–25, pale pink to rose-pink. *Pedicels* 3–15 mm long, pale green to pink or reddish-pink. *Perianth* 8–12 mm long; tube 1–1.5 mm long, gradually widening upwards; segments spreading, linear to narrowly lanceolate, 6.5–11 mm long, 1–2 mm wide; tip obtuse to acute. *Filaments* erect, exerted by up to 5 mm, pale to deep pink. *Anthems* 1–1.5 mm long when open, yellow. *Ovary* subglobose, 1.5–2 mm diam., green to reddish-pink. *Style* slightly exceeding the stamens. *Berries* ovoid, about 10 mm diam., becoming reddish-pink, firm and fleshy. *Seeds* 1–4, ovoid, about 5 mm diam., turning dark wine-coloured.

Flowering time: March–April.

Leafing period: from May until September.

Distribution and habitat: narrowly confined to the flats around Stellenbosch, an area with an elevation of 150 m above sea level and an annual rainfall of about 500 mm. The species favours heavy soils composed of an alluvium of Table Mountain Sandstone, Cape Granite and Malmesbury Shale, which remains waterlogged during the winter months. Populations are very localised and are presently known from only three sites; two very small populations from farms near Stellenbosch and another large population of many hundreds of bulbs near the Duthie Nature Reserve, Stellenbosch (Fig. 24).

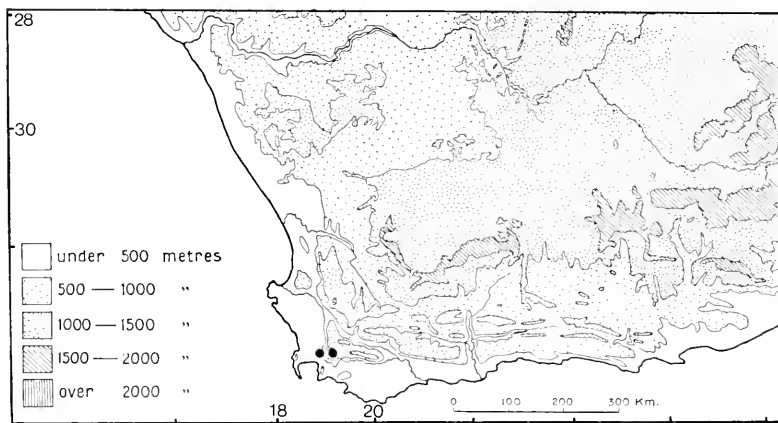


FIG. 24
Distribution of *H. pumilio* Jacq.

Haemanthus pumilio is one of a number of species with pink, slightly spreading inflorescences surrounded by 4-6 thin-textured spathe valves, but it is easily distinguished vegetatively. The bulbs consist of loose, fleshy distichous cream-coloured tunics without accumulated layers of dark brown papery remains. The leaves which are suberect, glabrous, shiny green and slightly barred with red on the abaxial surface, are characteristically narrow (2.5-15 mm across), fleshy and somewhat twisted.

In the past, herbarium specimens of the unrelated western Karoo species, *H. barkerae*, were often referred to *H. pumilio*, due to the similarity of their spreading pink inflorescences. A study of living plants however, has revealed ample differences between the species, particularly with respect to the morphology of the bulbs and leaves.

Haemanthus pumilio is presently regarded as an endangered species. The only viable population is located on the University of Stellenbosch campus, where it is unfortunately not assured of long-term protection.

CAPE—3319 (Worcester): Salem farm at base of Klein Drakenstein (-CC), *Galpin* 10741 (PRE), *Galpin* s.n. (BOL).

—3318 (Cape Town): Groot Drakenstein, Paarl (-DD), *Hulse* s.n. (NBG); Between Klappmuts and Paarl, *Burgers* 2345 (NBG); Stellenbosch, *Duthie* s.n. (PRE 36886, 36887), *Duthie* 1351 (BOL), *Garside* s.n. (BOL); Stellenbosch flats, *Garside* 1377 (K), *Oliver* 152 (NBG), *Olivier* s.n. (NBG); Flats at Duthie Nature Reserve, *Snijman* 248 (K, MO, NBG); Klein Welmoed, *Pillans* 9968 (BOL).

PLATE 12.

H. pumilio Jacq. (*Snijman* 668, Stellenbosch) 1 bulb and leaves $\times 1$; 2 inflorescences $\times 1.5$; 3-4 flowers $\times 2$; 5 berries $\times 1$.



14. *Haemanthus lanceifolius* Jacq., Hort. Schoenbr. 1: 31 t. 60 (1797) as *H. lanceaefolius*; Herbert, Amaryllid.: 234 (1837); Baker, Handb. Amaryllid.: 67 (1888) and in Flora Cap. 6: 233 (1896). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 1: t. 60 (1797) (lectotype, here designated). **Plate 13.**

Serena lancifolia (Jacq.) Raf., Flora Telluriana 4: 20 (1838).

Melicho lanceaefolius (Jacq.) Salisb. ex Baker in Flora Cap. 6: 233 (1896), in synonymy only, combination not made by Salisbury.

Bulb solitary or clumped, small, ovoid, more or less round in cross section, up to 50 mm diam.; tunics unequal, imbricate, with oblique margins, cream-coloured, mostly covered with dark brown withered remains. *Leaves* 2, adpressed to the ground, appearing after the inflorescence; blade oblong to elliptical, 70–150 mm long, 50–95 mm wide, flat, leathery; adaxial surface dark green, roughish; abaxial surface light green, immaculate, or occasionally speckled with red, smooth; margin cartilaginous varying from smooth to fringed and maroon to hyaline; apex obtuse to subacute. *Peduncle* slender, up to 180 mm long, 4–8 mm wide across greatest diam., pale to deep pink, sometimes marbled, slightly rough or smooth. *Umbel* very lax, becoming more or less hemispherical, 25–60 mm across. *Spathe valves* 6–7, spreading, soon becoming reflexed, shorter or as long as the flowers, narrowly triangular, 15–24 mm long, 2.5–11 mm broad at the base, pink, membranous. *Flowers* 20–65, pale pink or white and fading to pale pink. *Pedicels* 5–20 mm long, pink. *Perianth* 6–9 mm long; tube 1–2 mm long gradually widening upwards; segments widely spreading, linear, 5–7 mm long, 0.5–1.5 mm wide; tips obtuse. *Filaments* exerted up to 8 mm, white to pink. *Anthers* 1–1.5 mm long when open, yellow. *Ovary* more or less subglobose, 1–2 mm diam., green to deep pink. *Style* as long as the stamens. *Berries* ovoid, 10–11 mm diam., pink, pulpy and aromatic when ripe. *Seeds* 1–2, ovoid, up to 6 mm diam., turning dark wine-coloured.

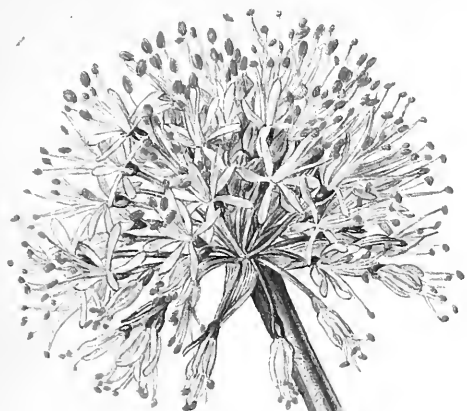
Flowering time: March–April.

Leafing period: May–October.

Distribution and habitat: known from only a small area in Namaqualand between Klawer and Vanrhynsdorp, along the banks of the Wiedourivier and the lower south western slopes of the Gifberg massif; an area which receives approximately 145 mm of rain per annum. Populations consist of many scattered individuals growing either in loose wind-blown sand or in heavy stony soils which are thought to be rich in lime. It is a lowland species recorded only from elevations of 150 to 250 m above sea level (Fig. 25).

PLATE 13.

H. lanceifolius Jacq. (Snijman 147, Aties) 1 inflorescence \times 1; 2 spathe valves \times 1; 3 flower \times 2; 4 half flower \times 4; 5 leaf \times 1; 6 section of leaf \times 1; 7 bulb \times 1.



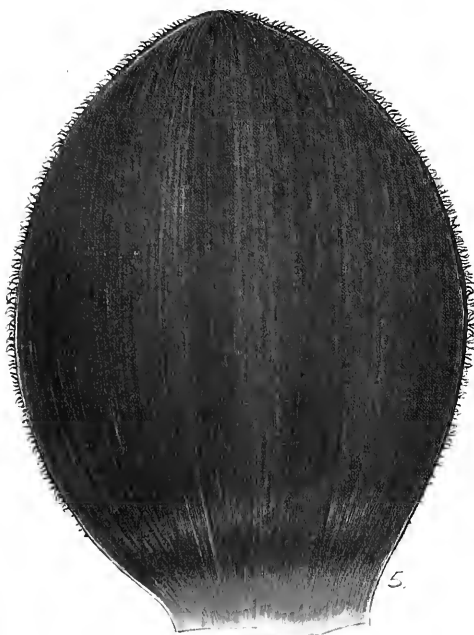
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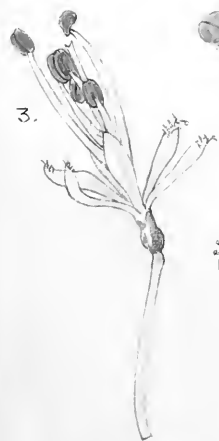
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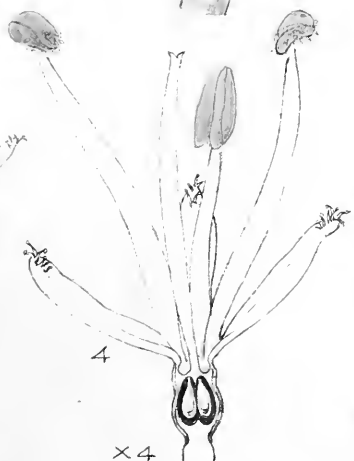
5.



7.



3.



4

X2

X4

HAEMANTHUS LANCEIFOLIUS JACQ.

Revard

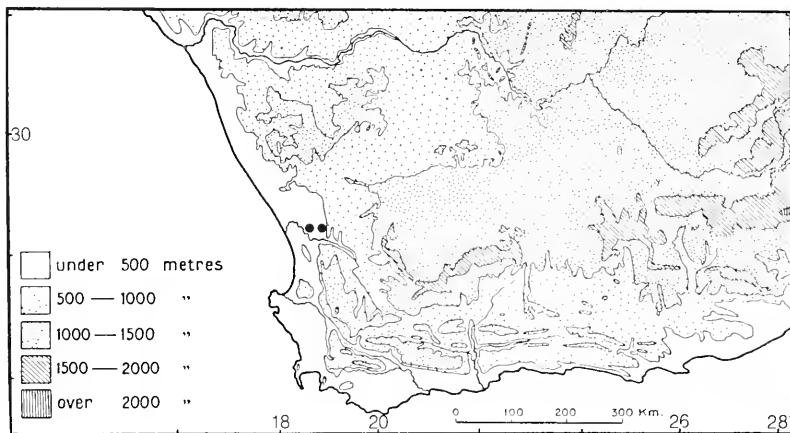


FIG. 25.
Distribution of *H. lanceifolius* Jacq.

Haemanthus lanceifolius is distinguished mostly by its floral parts. The umbel is hemispherical with very small, white or pink flowers. The perianth is characteristically short, 6–9 mm long with widely spreading linear segments and well-exserted stamens. The leaves are similar to those of *H. sanguineus*. They are adpressed to the ground, oblong to elliptical and leathery with cartilaginous margins.

For almost two centuries *H. lanceifolius* was known only from Jacquin's plate (1797: t. 60). In the absence of specimens, Friis & Nordal (1976) referred *H. lanceifolius* to the *H. carneus* complex, adding however, that the glabrous leaf surface and peduncle described for *H. lanceifolius* was not known in this complex. Flowering material of *H. lanceifolius* had in fact been collected by J. P. H. Acocks on the farm Sandkraal, south of Vanrhynsdorp, in 1948, but in the absence of leaves, the identity of the specimens remained uncertain. I subsequently collected both leaves and flowers at the farm Sandkraal and was able to confirm the identity of these specimens as *H. lanceifolius*. The specimen illustrated in Plate 13 has leaves which are more rounded and an inflorescence which is larger than those described by Jacquin, but many bulbs have narrow oblong or lanceolate leaves and few-flowered inflorescences which provide a good match with Jacquin's description. The specimen, *Snijman 151* (NBG), is a particularly good likeness of Jacquin's plate.

In assigning the name *H. lanceifolius* to this species, due consideration has also been given to evidence that Jacquin's collectors, Boos & Scholl,

visited southern Namaqualand (Garside, 1942). There is little doubt therefore that Jacquin's description of *H. lanceifolius* was based on collections from the Vanrhynsdorp area.

Some difficulty has been experienced in determining the correct spelling of the specific epithet of this species. Jacquin originally spelled the name *H. lanceaefolius* (Hort. Schoenbr. 1797: 1, 31). Another rendering, *lanceifolius*, is also apparently used (Stearn, 1966: 455). However, neither appear to be in accordance with the ICBN recommendations on orthography (Stafleu, 1978). Following recommendation 73G it appears that the most acceptable spelling is *lanceifolius*. The stem of *lancea* ends in a vowel *a*. In compounds this stem vowel is deleted before a consonant and *i* is substituted, hence lance-i-folius.

CAPE—3118 (Vanrhynsdorp): Farm Aties south west of Vanrhynsdorp (-DA), *Snijman 147* (K, NBG, PRE); North bank of Wiedourivier, between Klawer and Vanrhynsdorp, *Snijman 151* (NGB), *Snijman 434* (K, MO, NBG, PRE); Lower south west slopes of Matsikamma, farm Sandkraal (-DB), *Acocks 14177* (PRE), *Snijman 594* (NGB).

15. ***Haemanthus amarylloides*** Jacq., Hort. Schoenbr. 4: 5 t. 408 (1804); Herbert, *Amaryllid.*: 233 (1837), as *H. amaryllidioides*; Snijman in *Jl S. Afr. Bot.* 48: 96 (1982). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 4: t. 408, (lectotype, Bjørnstad & Friis, 1972).

Melicho amarylloides (Jacq.) Salisb. ex Baker in *Flora Cap.* 6: 234 (1896), name in synonymy only.

Amaryllis haemanthoidea Tratt., *Auswahl Gartenpfl.* 1: 38 (1821), nom. superfl. Type: As for *H. amarylloides* Jacq.

Bulb solitary, pyriform to globose, more or less round in cross section or slightly compressed laterally, 30–75 mm diam.; tunics unequal, imbricate, mostly with oblique margins or occasionally with horizontal margins, cream-coloured, the withered parts sometimes persisting as a brown covering. *Leaves* 2, rarely 3, either flat on ground or erect, appearing after the inflorescence; blade narrowly to broadly ligulate or lanceolate to elliptical, 40–250 (–340) mm long, (8–)10–120 mm wide, flat, flaccid or stiff and succulent; both surfaces immaculate, with or without a reddish blush towards the base of the abaxial surface, glabrous; margin sometimes thickened, either green, yellowish-green or red, smooth or with short cartilaginous cilia; apex obtuse or subacute. *Peduncle* slender to stout, 50–200 mm long, 5–12 mm across greatest diam., creamy-pink to deep rose-pink or reddish-pink, immaculate, glabrous or densely covered with short stiff hairs. *Umbel* widely obconical to spherical, 30–75 mm across. *Spathe valves* 4–9, spreading apart, shorter than or as long as the flowers, triangular, (15–)20–38 mm long, 3–

11 mm broad at the base, pale or deep pink, thin-textured, sometimes becoming mottled with age, tips acute. *Flowers* 15–115, pale or dark pink. *Pedicels* (8–)10–20(–23) mm long, pale pink or brownish-pink. *Perianth* (7–)12–19 mm long; tube 0,5–3 mm long, widening gradually upwards; segments widely spreading or somewhat erect, linear to narrowly lanceolate, (6–)11–16 mm long, 0,75–3 mm broad; tips subacute. *Filaments* exerted by up to 7 mm, white to pink. *Anthers* 1–2 mm long when open, yellow. *Ovary* subglobose, about 2 mm diam., green to brownish-pink. *Style* as long as the stamens. *Berries* ovoid, about 7–12 mm across, deep pink. *Seeds* ovoid, about 5 mm diam.

Flowering time: February to May.

Leafing period: from May to October.

Distribution and habitat: spread over the high lying region between Springbok and Grootvlei in Namaqualand and along the edge of the Bokkeveld mountains escarpment to the Gifberg, south of Vanrhynsdorp, at altitudes of approximately 600 m above sea level. Rainfall in the area varies from 200 to 360 mm per annum. Populations are restricted to seasonally wet depressions (Fig. 26).

Haemanthus amarylloides is distinguished by its obconic to spreading pink umbels, surrounded by 4–9 thin-textured spathe valves. The perianth segments are erect to widely spreading and linear to lanceolate (1,5–3 mm wide). The leaves are narrowly ligulate to broadly elliptical, glabrous, either erect or flat on the ground; they are without markings apart from a pink blush towards the base of the abaxial surface. The bulb tunics die down only slightly obliquely and are either cream-coloured or covered with layers of dark brown withered remains.

In an earlier publication (Snijman, 1982) two subspecies were recognised. Subspecies *amarylloides*, which is known from localised populations at Grootvlei in Namaqualand, as well as along the edge of the Bokkeveld mountains near Nieuwoudtville, and subspecies *polyanthus* which has a more northerly range towards Springbok.

Over the years repeated collections of an unusual form of *Haemanthus* have been made at the Gifberg, 60 km south west of the Vanrhyns Pass, but had not been allocated to any known taxon. Access to the escarpment between the Gifberg and Vanrhyns Pass is greatly hampered by the deeply dissected nature of its terrain, but a study of the Gifberg populations reveals

PLATE 14.

H. amarylloides Jacq. subsp. *amarylloides* (Snijman 590, farm Arendskraal)
1 inflorescence × 1; 2 flower × 1; 3 section of flower × 2; 4 spathe valve × 2; 5 bulb
and leaves × 1.



HAEMATHTUS AMARYLLOIDES JACQ. SSP. *AMARYLLOIDES*

consistent, though somewhat minor, morphological differences from those near Vanrhyns Pass; the specimens being generally more robust and succulent than those in the north. Thus on the basis of their geographic isolation and their morphological discontinuity, the Gifberg populations are regarded here as constituting an additional subspecies of *H. amarylloides*. Should future collecting yield further intermediates between these subspecies it will however become necessary to review their present status.

The name *H. amarylloides* was repeatedly applied in the past to a similar, yet distinct, species from the summer rainfall region of southern Africa (Baker, 1888, 1896; Sealy, 1963; Friis & Nordal, 1976). The evidence presented recently (Snijman, 1982), shows however, that specimens from Namaqualand are a much better match with Jacquin's description. The name was thus transferred, leaving the summer rainfall species, previously referred to as *H. amarylloides*, with the next available epithet, namely *H. montanus*.

The first person to re-collect *H. amarylloides* after its discovery by Jacquin's collectors, Boos & Scholl, was Miss A. J. Mostert, on the farm Cloudskraal near Nieuwoudtville in 1927. Most early collections were loosely referred to in South African herbaria as *H. pumilio*.

KEY TO THE SUBSPECIES

1. Spathe valves 6–9, rarely 5; perianth 7–10 mm long; segments linear, widely spreading; leaves flaccid b. subsp. **polyanthus**
- 1'. Spathe valves 4–6; perianth 12–19 mm long; segments lanceolate, erect to slightly spreading; leaves stiff.
 2. Leaves recurved to erect, broadly to narrowly ligulate, 10–40 mm wide, firm-textured a. subsp. **amarylloides**.
 - 2'. Leaves adpressed to the ground, oblong-lanceolate to elliptic, 55–120 mm wide, succulent c. subsp. **toximontanus**

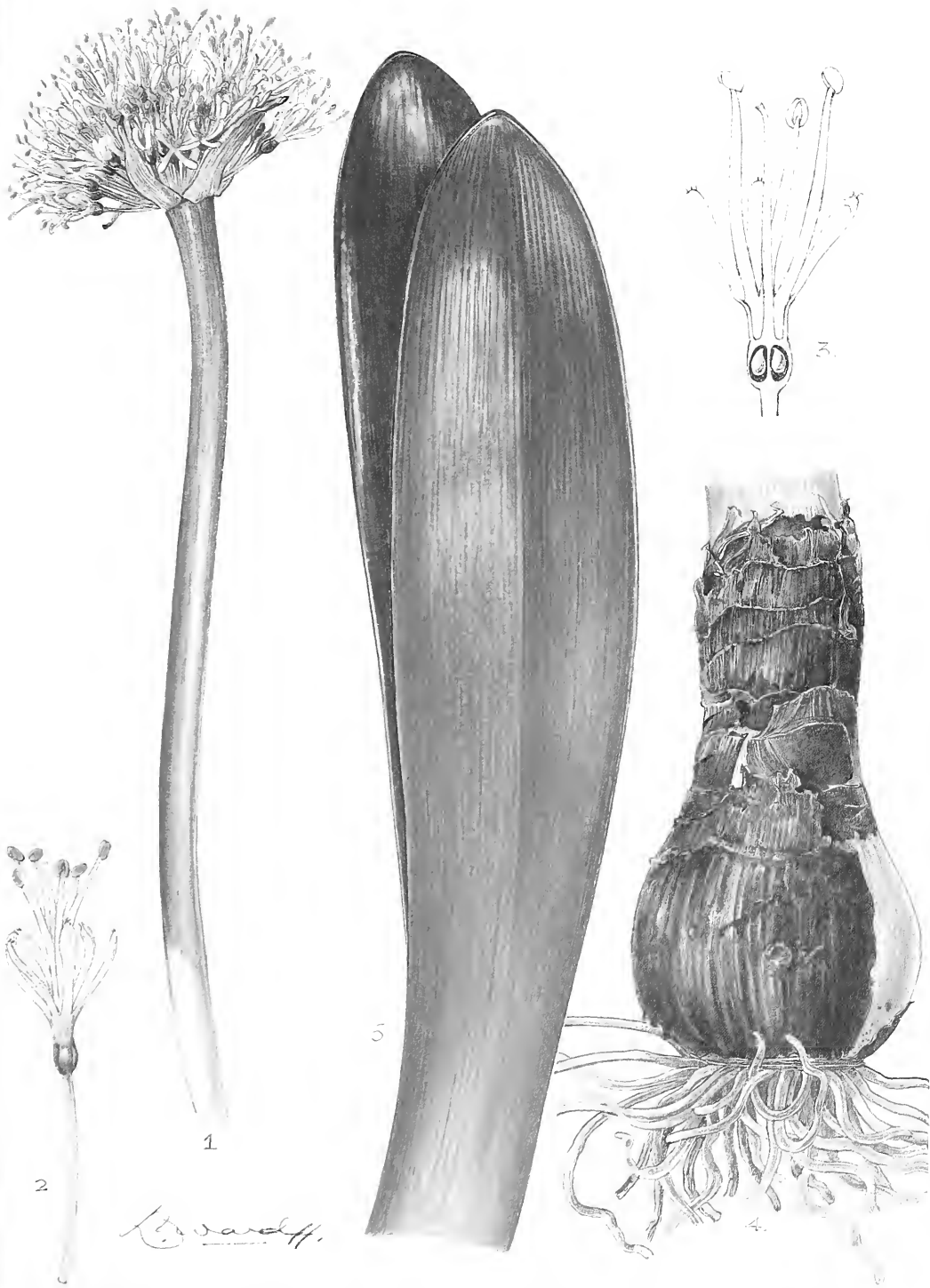
a. subsp. **amarylloides**. Plate 14.

Leaves flat on the ground or erect; blade narrowly to broadly ligulate, 40–250 mm long, 10–40 mm wide, firm-textured. *Peduncle* glabrous. *Umbel* widely obconical. *Spathe* valves 4–5(–6). *Flowers* 15–40, pale or dark pink. *Perianth* (10–)12–14 mm long; segments slightly spreading, narrowly lanceolate.

Distribution and habitat: in the vicinity of Grootvlei in Namaqualand, as well as on the Bokkeveld mountains escarpment near Nieuwoudtville. The associated vegetation ranges from low succulent veld in the north to arid fynbos in the south. Soils are either granitic or of Table Mountain Sandstone origin (Fig. 26).

PLATE 15.

H. amarylloides Jacq. subsp. *polyanthus* Snijman (Snijman 190, near Grootvlei)
1 inflorescence × 1; 2 flower × 2; 3 half flower × 3; 4 bulb × 1; 5 leaves × 1.



HEMANTHUS AMARUS, BLOEDER, NACH. DOL. POLYANTHUS, SUTHERLAND

CAPE—3017 (Hondeklipbaai): Grootvlei (-BB), *Compton* sub NBG 236/45 (NBG), *Müller-Doblies* 79199 (NBG), *Snijman* 706 (NBG, PRE). —3119 (Calvinia): Top of Vanrhyns Pass (-AC), *Thomas s.n.* (K, NBG, PRE), *Bar-ker* 9785 (NBG); Cloudskraal, *Mostert* sub *Marloth* 13486 (PRE); Farm Arendskraal west of Nieuwoudtville, *Snijman* 590 (NBG), *Snijman* 599 (NBG); Near farm Nuwe-fontein, 30 miles south of Nieuwoudtville (-CA), *Burgers* 499 (NBG).

b. subspecies **polyanthus** Snijman in Jl S. Afr. Bot. **48**: 99 (1982). Type: South Africa, Cape Province, 8 km west of national road towards Grootvlei, fl. 28/3/1981, *Snijman* 415 (NBG, holotype; K, MO, PRE, isotypes) **Plate 15**.

Leaves erect, blade lorate to oblanceolate, 140–340 mm long, 25–65 mm wide, flaccid. *Peduncle* glabrous or rough with short stiff hairs. *Umbel* becoming spherical. *Spathe* valves (5–)6–9. *Flowers* (40–)50–115, light pink. *Perianth* 7–10 mm long; segments widely spreading, linear.

Distribution and habitat: abundant in Namaqualand between Springbok and the Kamiesberg; an area with a vegetation cover of low shrubs and succulent bushes. Populations are usually large (Fig. 26).

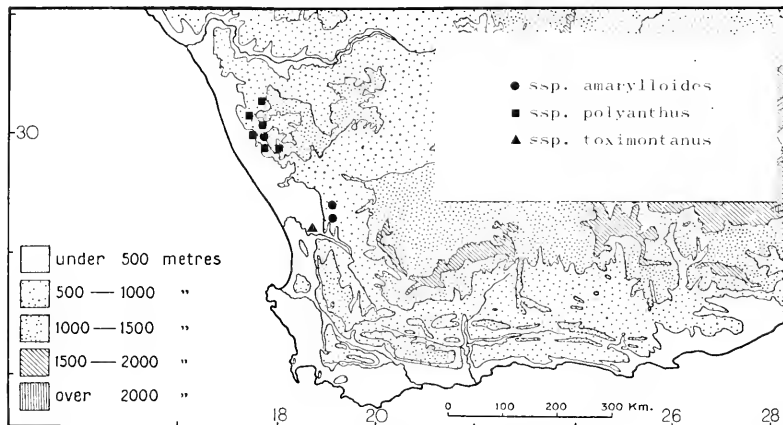


FIG. 26.
Distribution of *H. amarylloides* Jacq.

Prior to 1981, *H. amarylloides* subsp. *polyanthus* was known from surprisingly few collections. The subspecies was first collected by Prof. R. H.

PLATE 16.

H. amarylloides Jacq. subsp. *toximontanus* Snijman (*W. Olivier* 193, Gifberg) 1 inflorescence \times 1; 2 bulb \times 1; 3 spathe valve \times 1; 4 flower \times 1; 5 leaves \times 1; 6 section of flower \times 2.



HARMANTELLUS AZAMATELOIDES JACQ. SER. TOXIKANTALIS BRUMMAN

Compton and party at Clanwilliam in 1941, but subsequent collections have only come from central Namaqualand. Bulbs flower prolifically after good autumn rain and present a most attractive sight. The subspecies grows sympatrically with *H. crispus* and at many sites the short red inflorescences of *H. crispus* can be seen juxtaposed with the spreading pink umbels of *H. amarylloides* subsp. *polyanthus*. There are no signs of hybridisation between the two taxa.

CAPE—2917 (Springbok): Farm Biesjesfontein, south of Springbok (-DB), *Snijman 420* (K, NBG, PRE); 17 km from Spektakel turnoff towards Komaggas (-DC), *Snijman 185* (NBG, PRE).

—3017 (Hondeklipbaai): Ascending Killians Pass from the west (-BA), *Snijman 189* (NBG, PRE); 4.7 km east of Grootvlei (-BB), *Snijman 190* (K, MO, NBG, PRE); Farm Skilpad, north of Grootvlei, *NBG Expedition 370/67* (NBG); Bowesdorp, 8 km north of Kamieskroon, *Hall 4195* (NBG); 8 km west of national road towards Grootvlei, *Snijman 415* (K, MO, NBG, PRE); Along Wallekraal road between farms Grootvlei and Nieuwe Plaats, *van Berkel 306* (NBG); 1 km north of Darters Grave (-BD), *Snijman 192* (NBG, PRE), *Snijman 413* (MO, NBG); Karkams, *Snijman 411* (K, NBG, PRE).

—3018 (Kamiesberg): Eastern slopes of Welkom, Kamiesberg (-AC), *Snijman 312* (NBG, PRE).

Inexact locality: Near Clanwilliam, *Compton & party* sub NBG 437/41 (NBG).

c. subsp. ***toximontanus*** Snijman, subsp. nov. **Plate 16.**

Differt a subsp. *amarylloides* umbella densiore et foliis latioribus (55–120 mm latum).

Type: South Africa, Cape Province, top of Gifberg, south of Vanrhynsdorp, bulbs collected 6/4/1964, *E. Oliver s.n.* (NBG 77774, holotype; MO, PRE 45481, isotypes).

Leaves adpressed to the ground; blade oblong to broadly elliptical, 80–180 mm long, 55–120 mm wide, succulent. *Peduncle* smooth. *Umbel* obconical. *Spathe valves* 6. *Flowers* 30–50, rose-pink. *Perianth* 13–19 mm long; segments erect, narrowly lanceolate.

Distribution and habitat: the summit of the Gifberg, south of Vanrhynsdorp. The dominant vegetation is arid fynbos on a substrate of Table Mountain Sandstone, but populations are restricted to small patches of humus-rich soil, either damp depressions or rock flushes, in association with liverworts and *Drosera* (Fig. 26).

Bulbs were first collected by Mr. E. G. H. Oliver in 1964. These were distributed to the National Botanic Garden Kirstenbosch and the Botanical Research Institute in Pretoria where they later flowered.

CAPE—3118 (Vanrhynsdorp): Top of Gifberg (-DC), *E. Oliver s.n.* (NBG 77774, 82004, 85886, 94458, MO, PRE 45481, 45505); Gifberg Plateau, *van Jaarsveld 4374* (NBG), *W. Olivier 193* (K, NBG).

16. **Haemanthus graniticus** Snijman, sp. nov. **Plate 17.**

Haemanthus graniticus Snijman species nova; foliis lanceolatis nitidibus viridibus, umbella compacta rubida et valvis spathaceis non crassis, distinguatur.

Bulbus aggregatus, obclavatus lateraliter compressus vel plus minusve rotundus in sectione transversali, 55–70 mm diam., induviatus; tunicas tenues, imbricatas, aliquantum distichas, marginibus obliquis. *Folia* 2 interdum 3, erecta, hysteraantha, anguste ad late lanceolata 140–275 mm longa et 15–50 mm lata, plana vel basi leviter canaliculata; utrinque nitida viridia, glabra, plerumque immaculata; infra interdum transtris paucis rubidis lineolata; margine laevia, viridia vel rubida; apice acuta vel obtusata. *Pedunculus* validus vel gracilis, ad 240 mm longus, compressus, 5–16 mm diametro maximo, rubidus, immaculatus, glaber. *Umbella* compacta, obovoidea ad obconica, 30–50 mm lata. *Valvae spathaceae* (4–)6–7, erectae, discretae vel leviter imbricatae, floribus breviorae vel longiorae, anguste vel late lanceolatae, 30–47 mm longae, (6–)9–19 mm latae, rubidae, firmae sed non crassae, apice acutae. *Flores* (15–)20–70, rubidi. *Pedicelli* 7–14 mm longi, subrosei. *Perianthium* 14–21 mm longum; tubo 2,5–5 mm longo; segmentis erectis, anguste oblongis, 9–18 mm longis et 1–2 mm latis, apicibus obtusatis. *Filamenta* ad 7 mm exserta, plerumque albida. *Antherae* apertae 1,5–2 mm longae, luteae. *Ovarium* subglobosum 2–3 mm diam., erubescens, stylo stamina aequanti. *Baccae* incognitae.

Type: South Africa, Cape Province, eastern slopes of farm Welkom, Kamiesberg, fl. 30/3/1981, *Snijman 424* (NBG, holotype; K, PRE, isotypes).

Bulbs forming clumps, obclavate, laterally compressed or almost round in cross section, 55–70 mm across; tunics thin, imbricate, more or less distichous, with oblique margins, turning deep pink when exposed to light, mostly covered by withered brown papery remains. *Leaves* 2, occasionally 3, erect, appearing after the inflorescence; blade narrowly to broadly lanceolate, 140–275 mm long, 15–50 mm broad near the middle, flat or slightly channelled below; both surfaces shiny green and glabrous, immaculate or slightly barred with red towards the base of the abaxial surface; margin smooth, green or red; apex acute or obtuse. *Peduncle* stout or slender, up to 240 mm long, compressed, 5–16 mm wide across the greatest diam., scarlet to deep red or pale carmine, immaculate, glabrous. *Umbel* compact, obovoid to obconical, 30–50 mm across. *Spathes* (4–)6–7, erect, set apart

or slightly overlapping, shorter to longer than the flowers, narrowly to broadly lanceolate, 30–47 mm long, (6–)9–19 mm broad at the middle, red or pale carmine, firm but not fleshy; tips acute. *Flowers* (15–)20–70, red to rose-pink. *Pedicels* 7–14 mm long, red or pink. *Perianth* 14–21 mm long; tube 2.5–5 mm long, slightly expanded upwards; segments erect, narrowly oblong, 9–18 mm long, 1–2 mm wide; tips obtuse. *Filaments* exerted by up to 7 mm, mostly white. *Anthers* 1.5–2 mm when open, yellow. *Ovary* subglobose, 2–3 mm diam., greenish-red or pink. *Style* as long as the stamens. *Berries* not known.

Flowering time: March–April, a month earlier in cultivation.

Leafing period: from May until October.

Distribution and habitat: recorded from two localities in Namaqualand between Springbok and the Kamiesberg, at altitudes of 600 to 1 150 m. Populations consist of large clumps of bulbs, scattered along seasonal watercourses. The soils are coarse and granitic with a surrounding cover of mountain renosterveld and Namaqualand Broken Veld (Fig. 27).

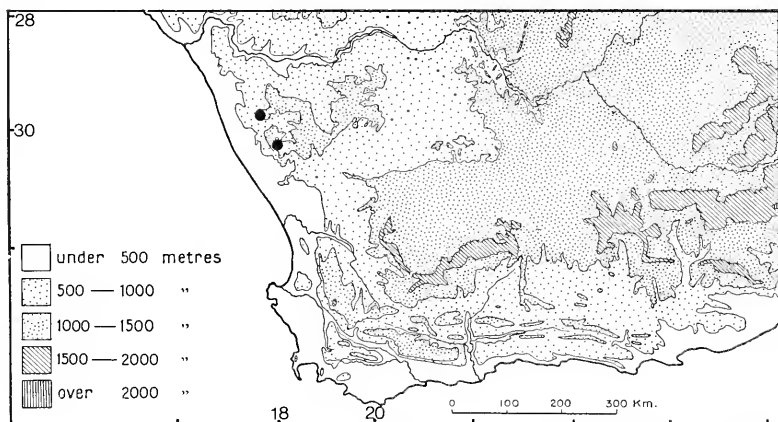
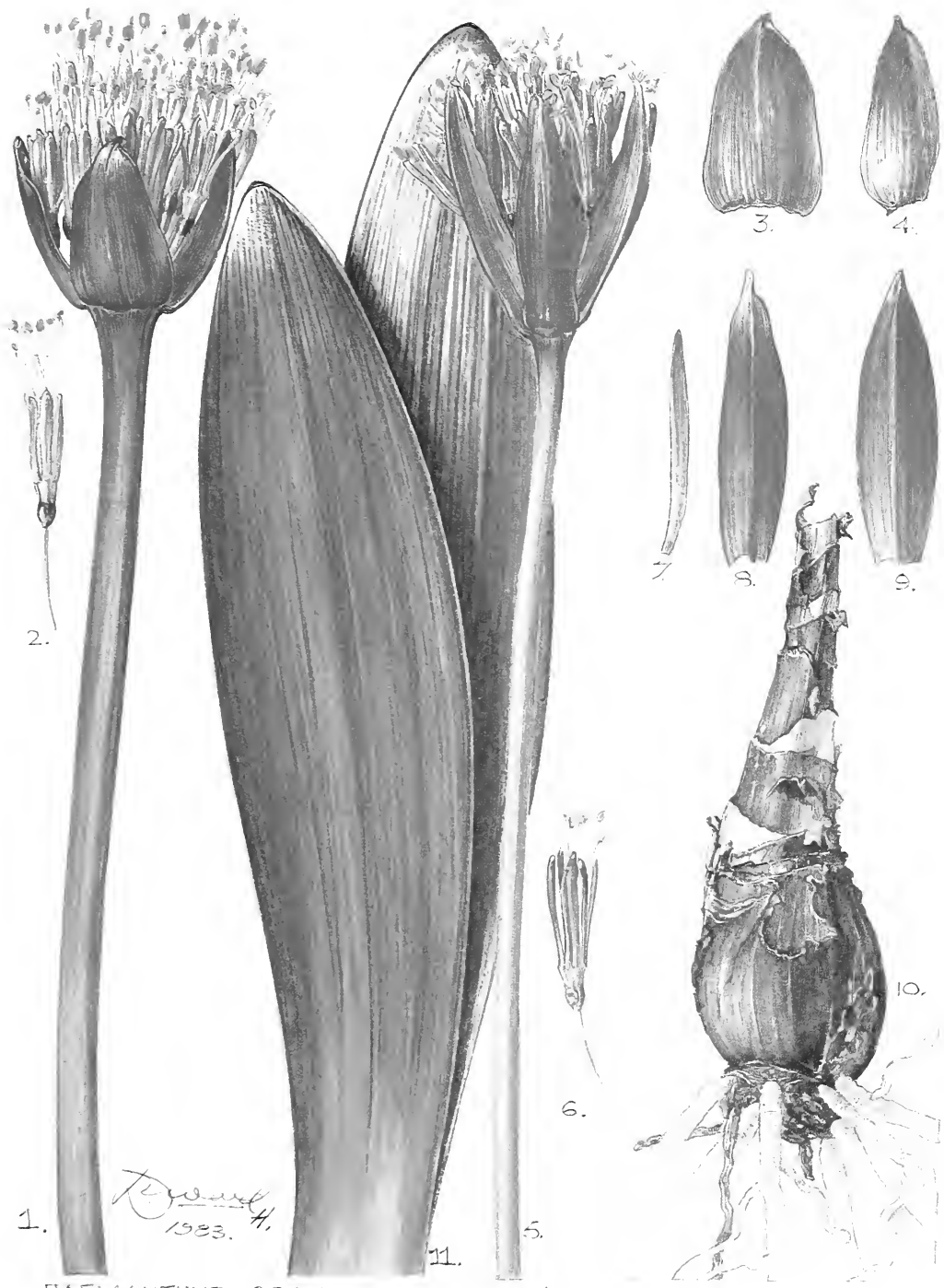


FIG. 27.
Distribution of *H. graniticus* Snijman

Haemanthus graniticus is distinguished by a combination of floral and vegetative characters. The peduncle is unmarked and the umbel compact, surrounded by 6–7 erect, thin-textured, lanceolate spathe valves. The flow-

PLATE 17.

H. graniticus Snijman (Snijman 308, near Wildepaardehoek Pass) 1 & 5 inflorescences \times 1; 2 & 6 flowers \times 1; 3, 4, 7, 8 & 9 spathe valves \times 1; 10 bulblet \times 1; 11 leaves \times 1.



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1933. 4.

HAEMANTHUS GRANITICUS SNIJMAN

ers and spathe valves vary from deep red to pale carmine. The leaves are erect, lanceolate, shiny green and glabrous on both surfaces; only sometimes barred with red at the base of the abaxial surface. The bulb is well-covered with brown withered tunics, while the inner tunics, which die back obliquely, turn dark pink if exposed to light.

In the vegetative phase *H. graniticus* is particularly difficult to distinguish from *H. amarylloides* subsp. *polyanthus* since both have very similar leaves and habitat preferences. Bulbs of *H. graniticus* were first collected near Wildepaardehoek Pass and the Kamiesberg in the winter months of 1980. At the time, the bulbs evoked no special interest as they were presumed to belong to the species *H. amarylloides* subsp. *polyanthus*. Only on returning to the Kamiesberg in March the following year, when the bulbs were seen to have brilliant red inflorescences, did it become apparent that they belonged to a new species. Close inspection revealed *H. amarylloides* subsp. *polyanthus* growing close by; but while *H. graniticus* was in full bloom, the pink inflorescences of *H. amarylloides* subsp. *polyanthus* were just beginning to appear above ground, thus forming a partial barrier between the two populations.

CAPE—2917 (Springbok): 23 km from Springbok to Wildepaardehoek Pass near farm Nooitgedacht (-DD), *Snijman* 308 (MO, NBG).

—3018 (Kamiesberg): Eastern slopes of farm Welkom, Kamiesberg (-AC), *Snijman* 311 (NBG), *Snijman* 424 (K, NBG, PRE), *Snijman* 425 (NBG).

17. ***Haemanthus nortieri*** Isaac in Jl S. Afr. Bot 3: 103 (1937): Friis & Nordal in Norw. J. Bot. 23: 68 (1976). Type: South Africa, Cape Province, Nardouw Mountains, September 1933, *Salter* 3622 (BOL, holotype).

Bulbs clumped, obovoid-globose, medianly compressed, up to 100 mm across, tunics unequal, in overlapping horizontal layers, cream-coloured, covered with dark brown papery remains. *Leaf* solitary or rarely 2, erect, appearing after the inflorescence; blade obovate to broadly spatulate, 130–200 mm long, 40–150 mm wide above, narrowed to 15–50 mm at the base, flat, thick and leathery; both surfaces dull green, flushed with red towards the base, somewhat scabrid and sticky to the touch; margin red or green; apex obtuse. *Peduncle* stout, slightly compressed, up to 300 mm long, 80–150 mm across greatest diam., deep red, immaculate, somewhat scabrid to the touch, especially towards the base. *Umbel* compact, narrowly to broadly cyathiform, 30–70 mm across. *Spathe valves* 5–8, erect, longer than or equalling the flowers, ovate-lanceolate, 20–50 mm long, 6–25 mm wide, red to deep dusky-rose, somewhat leathery; tips acuminate. *Flowers* 40–60, pale scarlet, paler towards the tube. *Pedicels* 10–15 mm long, rosy. *Perianth*

14–18 mm long; tube 2–3 mm long, widening gradually upwards; segments erect, narrowly oblong, 11–16 mm long, 1–1.5 mm broad; tips obtuse. *Filaments* exerted by up to 11 mm, reddish with white tips. *Anthers* 1.5–2 mm long, yellow. *Ovary* subglobose, about 2 mm diam., green with a reddish blush. *Style* as long as the stamens. *Berries* spheroid, about 10 mm diam., reddish-maroon. *Seeds* ovoid, about 5 mm diam., dark wine-coloured.

Flowering time: March–April.

Leafing period: from May until October.

Distribution and habitat: known only from the Nardouwsberge, in the western Cape Province, at an altitude of 200 m above sea level. The bulbs form clumps in deep yellowish sandy soil amongst flat Table Mountain Sandstone rocks; in seasonally wet seepage areas. The associated vegetation is dominated by *Willdenowia lucaeana* and *Leucospermum praemorsum* (Fig. 28).

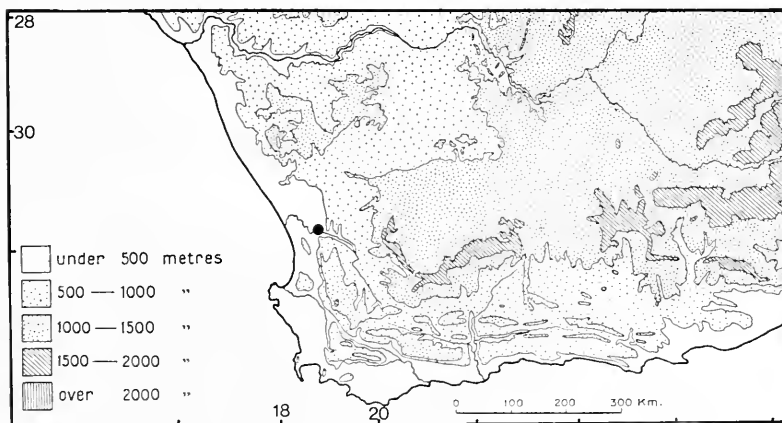


FIG. 28.
Distribution of *H. nortieri* Isaac

Haemanthus nortieri is very distinctive. The leaves are mostly solitary and are thick, leathery and erect. Unlike any other species in the genus they are rough and somewhat sticky to the touch. Many herbarium specimens consequently have particles of sand adhering to the leaves. The bulbs are typically compressed in the median plane and have tunics which die down horizontally. The inflorescences are deep red and are characterised by 5–8, erect, very acuminate, ovate-lanceolate spathe valves and unmarked, somewhat hispid peduncles.

The only other solitary-leaved species is *H. unifolius*. Although both

species are sometimes bifoliate, observations on bulbs grown at Kirstenbosch show that two leaves are only intermittently produced and do not occur in the same bulb each year. (See *H. unifolius* for further discussion.)

Haemanthus nortieri was first discovered by Dr. P. le F. Nortier on the Nardouw Mountains in 1933. As the species is very localised its status as either rare or endangered has been considered. Fortunately, the bulbs are known to favour sites amongst large flat rocks which presently excludes the use of the habitat for agriculture. Thus, although rare, the species does not appear to be threatened (Rourke, pers. comm.).

CAPE—3118 (Vanrhynsdorp): Nardouw Mountains (-DD), *Nortier s.n.* sub NBG 850/35 (BOL, NBG, PRE), *Salter* 3622 (BOL), *Rourke* 1071 (NBG), *Garside* 4481 (K).

18. *Haemanthus coccineus* L., Sp. Pl. ed. 1, 1: 325 (1753); Redouté, Liliac. 1: t. 39 (1802); Lodd., Bot. Cab. 3: t. 240 (1818); Baker, Handb. Amaryllid.: 71 (1888) and in Flora Cap. 6: 240 (1896); van Druten in Fl. Pl. S. Afr. 31: pl. 1239 (1956); Friis & Nordal in Norw. J. Bot. 23: 64 (1976) excl. *H. arnotii* Baker, *H. hookerianus* Herbert, *H. incarnatus* Burchell ex Herbert, *H. namaquensis* R. A. Dyer, *H. sanguineus* Jacq. and *H. zebrinus* Herbert. Type: South Africa, Cape of Good Hope, figure in Commelin, Horti Medici Amstelodamensis Rariorum 2: t. 64 (1701) (lectotype, Bjørnstad & Friis, 1972) **Fig. 1. Plates 18 and 19.**

H. carinatus L., Sp. Pl. ed. 2, 1: 413 (1762). Type: unknown, possibly not preserved.

H. coccineus L. var. *carinatus* (L.) Herbert, Amaryllid.: 236 (1837); Baker, Handb. Amaryllid.: 72 (1888) and in Flora Cap. 6: 240 (1896).

H. coarctatus Jacq., Hort. Schoenbr. 1: 30 t. 57 (1797). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 1: t. 57 (1797) (lectotype, Friis & Nordal, 1972).

H. coccineus L. var. *coarctatus* (Jacq.) Herbert, Amaryllid.: 236 (1837); Baker, Handb. Amaryllid.: 72 (1888) and in Flora Cap. 6: 240 (1896).

Perihema coarctata (Jacq.) Raf., Flora Telluriana 4: 20 (1838).

H. tigrinus Jacq., Hort. Schoenbr. 1: 29 t. 56 (1797); Sims in Bot. Mag. 41: t. 1705 (1815); Baker, Handb. Amaryllid.: 72 (1888) and in Flora Cap. 6: 241 (1896). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 1: t. 56 (1797) (lectotype, designated here).

H. crassipes Jacq., Hort. Schoenbr. 4: 7 t. 412 (1804); Baker, Handb. Amaryllid.: 72 (1888) and in Flora Cap. 6: 241 (1896). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 4: t. 412 (1804) (lectotype, designated here).

H. hyalocarpus Jacq., Hort. Schoenbr. 4: 5 t. 409 (1804); Baker, Handb.

Amaryllid.: 72 (1888) and in *Flora Cap.* 6: 241 (1896). Type: South Africa, Cape of Good Hope, figure in Jacq., *Hort. Schoenbr.* 4: t. 409 (1804) (lectotype, Friis & Nordal, 1976).

H. moschatus Jacq., *Hort. Schoenbr.* 4: 6 t. 410 (1804); Baker, *Handb. Amaryllid.*: 72 (1888) and in *Flora Cap.* 6: 240 (1896). Type: South Africa, Cape of Good Hope, figure in Jacq., *Hort. Schoenbr.* 4: t. 410 (1804) (lectotype, Friis & Nordal, 1976).

H. coccineus L. var. *grandivalvis* Herbert, *Amaryllid.*: 236 (1837). Type: South Africa, Cape of Good Hope, figure in *Bot. Mag.* 27: t. 1075 (1808) (lectotype, Friis & Nordal, 1976).

H. concolor Herbert, *Amaryllid.*: 238 pl. 31 fig. 2 (1837); Baker, *Handb. Amaryllid.*: 71 (1888) and in *Flora Cap.* 6: 238 (1896). Type: South Africa, Cape Province, 10/10/1826, *Burchell* bulb No. 276 (K, lectotype, designated by Friis & Nordal, 1976).

H. callosus Burchell ex Baker, *Handb. Amaryllid.*: 71 (1888) and in *Flora Cap.* 6: 239 (1896). Type: South Africa, Cape Province, *Burchell* bulb No. 129 (K, lectotype, designated by Friis & Nordal, 1976).

H. splendens Dinter in *Fedde Repert.* 19: 181 (1923). Type: South West Africa, Klinghardtberge, *Dinter* 4450 (M, lectotype, designated by Friis & Nordal, 1976; K, isolectotype).

H. latifolius Salisb., *Prodr.*: 216 (1796), nom. superfl. Type: as for *H. coccineus* L.

H. coccineus L. var. *albus* Stanford in *Herbertia* 10: 70 (1943), nom. nud.

Bulb solitary or clumped, ranging from elongate-ovoid to broadly ovoid or depressed ovoid, compressed laterally, 30–150 mm across; tunics thick, imbricate, distichous, cream-coloured, sometimes speckled with red in the upper parts; the margins oblique, withered and brown. *Leaves* 2 or rarely 3, suberect to recurved or prostrate, appearing after the inflorescence or rarely simultaneously; blade narrowly to broadly lingulate, elliptical or rotund (60–)150–450(–700) mm long, (25–)85–150(–210) mm broad at the middle, flat or somewhat canaliculate in the lower half, fleshy; adaxial surface bright to dull green or glaucous, immaculate or occasionally with dark green or maroon markings, smooth; abaxial surface light green or glaucous, immaculate or barred with maroon over the whole surface or towards the base, sometimes heavily barred with dark green on a whitish background, either glabrous or pubescent towards the edges and apex, or over the whole surface; margin sometimes red, smooth or softly ciliate, occasionally revolute; apex obtuse to acute. *Peduncle* usually stout, 60–370 mm long, (5–)10–20 mm across greatest diam., ranging from cream to pale green to light red with deep red spotting or deeper red streaks, sometimes plain red, glabrous

or rarely pubescent. *Umbel* either compact, cyathiform to campanulate and slightly compressed medianly, or sometimes spreading and obconical, 30–100 mm across. *Spathe valves* (4–)6–9(–13), erect and overlapping, sometimes somewhat spreading, shorter to longer than the flowers, irregular, ranging from broadly to narrowly oblong or lanceolate to elliptic, obovate or spatulate, 20–60 mm long, (7–)15–48 mm broad, coral, vermilion or scarlet, stiff and fleshy, rarely somewhat thin; margin sometimes softly ciliate; tips acute to obtuse. *Flowers* (20–)25–100, coral to scarlet with white tubes and tips or concolorous. *Pedicels* (2–)5–15(–18) mm long, cream to pale green or reddish. *Perianth* 14–30 mm long; tube 2–5 mm long, widening upwards, usually gibbose at the base of each segment; segments usually erect or sometimes spreading, narrowly oblong to spatulate, 12–26 mm long, 1–3,5 mm broad; tips obtuse to acute. *Filaments* exerted by up to 10 mm, pale scarlet, usually with white tips. *Anthers* 1–2 mm long when open, yellow. *Ovary* subglobose, 2–4 mm diam., pale green. *Style* as long as the stamens. *Berries* more or less ovoid, soft and pulpy, about 15 mm diam., white to pale or deep pink, translucent. *Seeds* 1–3, ovoid, 8–10 mm diam., dark wine-coloured.

Flowering time: February to April.

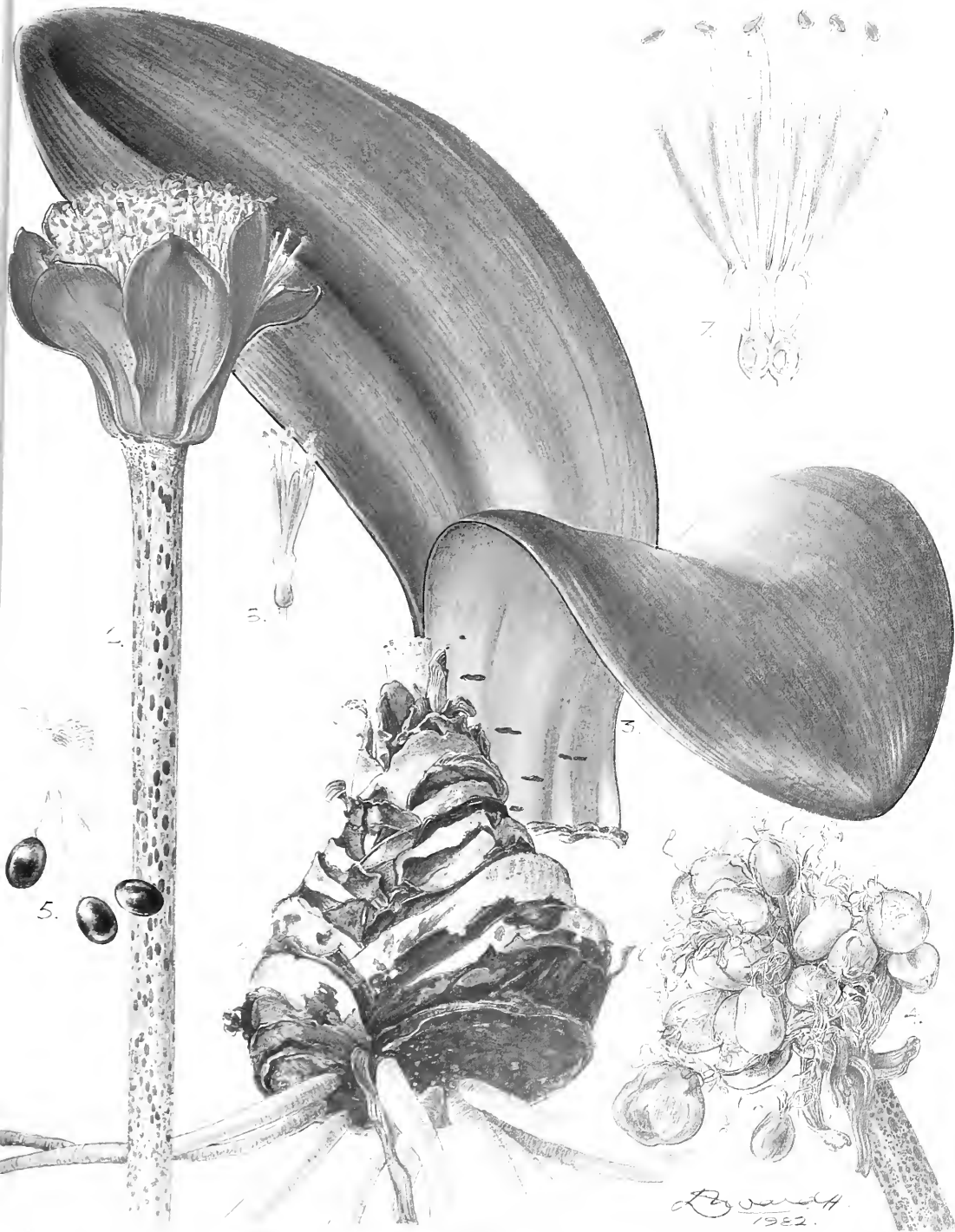
Leafing period: from April until October, sometimes as early as February.

Distribution and habitat: widely distributed throughout the winter rainfall region of southern Africa, from southern Namibia to the Cape Peninsula and eastwards to near Grahamstown. Habitats vary greatly. Soils are derived from granites, shale, quartzite, sandstone or limestone and rainfall over the area varies from 100 to 1 100 mm per annum. Altitudes range from sea level to mountain slopes of 1 200 m and the associated vegetation varies from karroid veld types to renosterveld and fynbos. Populations differ in size from dense stands of hundreds of individuals, to small groups of only a few bulbs. Sites most favoured are shaded kloofs and rock crevices but populations are also found on the flats in the shelter of bushes and shrubs (Fig. 29).

The features which distinguish *H. coccineus* are as follows. The leaves are narrowly to broadly lingulate to elliptical, (25–)80–150(–210) mm wide, usually more or less barred with red or dark green on the abaxial surface. The blades are mostly recurved but sometimes can be prostrate. The inflorescence is distinguished by stiff, red spathe valves, mostly 6 to 9 in number,

PLATE 18.

H. coccineus L. (Snijman 87a, Albertyn/Caledon road) 1 inflorescence \times 1; 2 bulb \times 1; 3 leaves \times 1; 4 infructescence \times 1; 5 seeds \times 1; 6 flower \times 1; 7 section of flower \times 2.



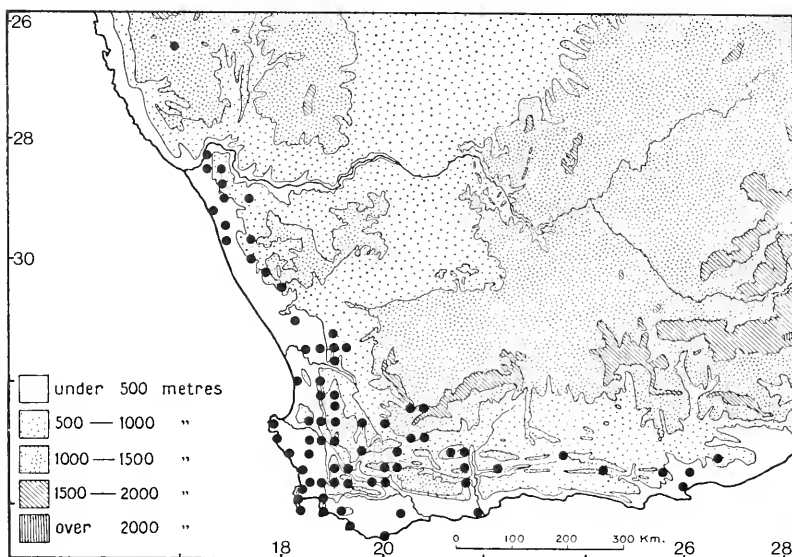


FIG. 29.
Distribution of *H. coccineus* L.

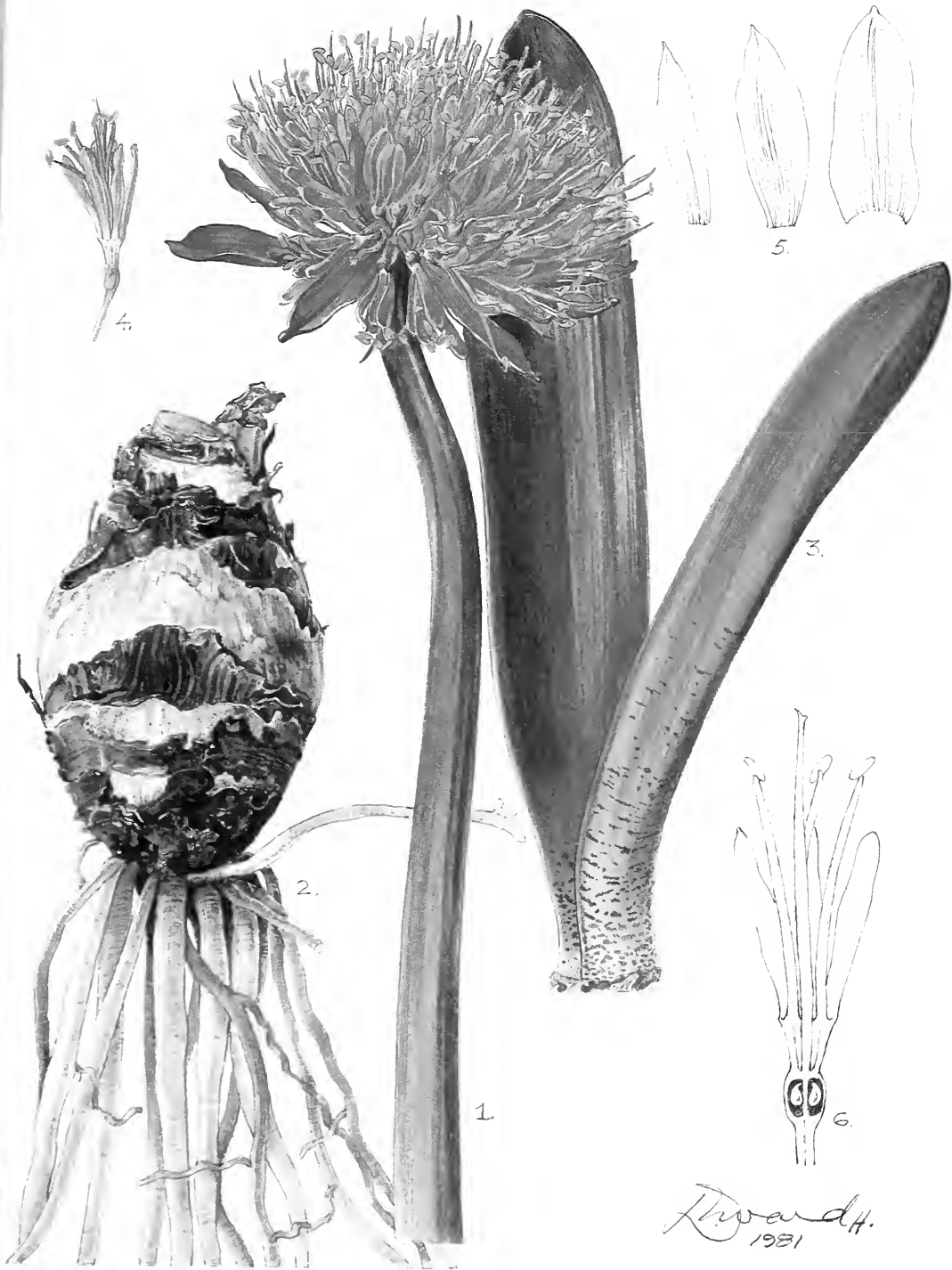
which either stand erect and closely surround the flowers or sometimes spread slightly apart. The peduncle is usually more or less spotted or streaked but may occasionally be unmarked. The umbel is dense and the perianth segments are erect to slightly spreading.

Haemanthus coccineus is the most widely ranging and variable species in the winter rainfall region of southern Africa. Considerable thought has been given to the possibility of dividing the species into infraspecific taxa, as many geographical races are recognisable but the complexity of the variation pattern makes a formal subdivision impracticable.

The broadest trends discernible throughout the range are as follows. Specimens from the west are more fleshy and succulent in both vegetative and floral parts, while populations from the east usually have thinner leaves and spathe valves which sometimes give the umbel a more lax appearance. In addition, populations in the west flower mostly near the end of March and are strictly hysteranthous, whereas populations east of Oudtshoorn flower earlier, in February, and sometimes have the leaves emergent with

PLATE 19.

H. coccineus L. (Roux 502, Walmer) 1 inflorescence $\times 1$; 2 bulb $\times 1$; 3 leaves $\times 1$; 4 flower $\times 1$; 5 spathe valves $\times 1$; 6 half flower $\times 2$.



HAEMANTHUS COCCINEUS L. (ROUX 502.)

the inflorescences. It is noteworthy that these differences have been maintained in most of the bulbs grown under uniform conditions at Kirstenbosch.

In addition to the above broad trends, the following local variants are considered most worthy of mention:

a. Collections north of Vanrhynsdorp have very succulent bright green leaves mostly with rolled-in margins. In southern Namaqualand the abaxial surface of leaves are mostly heavily barred with dark green, usually on a white background and with some pubescence towards the edges. It is these specimens which match Jacquin's *H. moschatus*. In the extreme north the barring is diminished and the pubescence limited sometimes to a ciliate margin. Such bulbs, which mostly have plain red peduncles, match Dinter's *H. splendens*.

b. In the mountainous areas of the south western Cape, from Piketberg to Worcester, bulbs have plane-edged, ciliate leaves with bold red barring on the abaxial surface. Of all the races this has the most strikingly spotted peduncles. These specimens were often referred to in South African herbaria as *H. tigrinus*.

c. Coastal populations in the south western and southern Cape vary considerably in leaf markings and shape. The leaves may be immaculate, slightly barred, glabrous or ciliate. Most specimens however are characterised by spotted peduncles and extremely broad, blunt, fleshy spathe valves which dominate the umbel. These floral characters are very similar to those of the type of *H. coccineus* (Plate 18; Fig. 1).

d. Populations in the east, from Montagu to Grahamstown, have consistently glabrous, glaucous leaves with fine red spotting and barring on the abaxial surface. The inflorescences are usually brilliant red and concolorous. From Oudtshoorn eastwards the spathe valves are particularly narrow and acuminate and the umbels are more lax; so that the differences in floral characters between *H. coccineus* and *H. sanguineus* in this region, are somewhat obscured. It is often only possible to distinguish the two species in the vegetative phase. Specimens from near Port Elizabeth match Burchell's type of *H. concolor* (Plate 19).

Included amongst the above fairly widely distributed variants are certain very restricted races which are of special interest. Specimens from the mountains near Clanwilliam (Roux 184, K, MO, NBG) are extremely large, with leaves up to 700 mm long and 210 mm wide. In contrast, bulbs from the De Hoop Nature Reserve, near Bredasdorp, which grow in shallow soils overlying limestone pavements, show extreme dwarfism. Some leaves are only 50 mm long and 40 mm wide (Snijman 113, K, NBG, PRE). Lastly, bulbs collected from the steep rocky slopes of river gorges near Calitzdorp,

have leaves heavily spotted with red and green on the adaxial surface as well as the abaxial surface (*Snijman* 395, K, MO, NBG, PRE, S).

On rare occasions a white form of *H. coccineus* has been reported. Burchell, in his *Travels in the Interior of Southern Africa* (1953: 42), recorded finding a population of *H. coccineus* near Salt River, in the south western Cape, amongst which was "a variety with white flowers". Another record comes from the farm Calenick, near Stellenbosch (Delpierre, 1976). The white form is typical of *H. coccineus* in all respects but has a pale green immaculate peduncle and no bars on the leaves.

Further names which are placed here into synonymy are *H. hyalocarpus*, *H. coarctatus*, *H. carinatus* and *H. callosus*, the latter being the only one to have caused some confusion in the past. Burchell's specimen (bulb 129, without locality at Kew) which bears the name *H. callosus*, was first cited under *H. lambertianus*. Later it was listed under *H. rotundifolius* by Kunth (1850) and thereafter under *H. rotundifolius* var. *multivalvis* by Herbert (1837). Baker (1888) was the first to recognise the distinctiveness of the specimen and to publish the name validly. In a note attached to the specimen, he states "*H. callosus* Burch, is referred in Kunth to *rotundifolius*, but it has large bracts overlapping the flowers". I endorse Baker's decision to set the specimen aside from *H. rotundifolius* and as field work has shown that Burchell's specimen matches the broad-leaved form of *H. coccineus* from the Gouritz River mouth (*Snijman* 317, K, MO, NBG, PRE), the name is placed here into synonymy with *H. coccineus*.

Bulbs of *H. coccineus* were amongst the first plants ever gathered by visitors to the Cape. The earliest known illustration and description of the species appeared in de l'Obel (1605) under the phrase name *Narcissus africanus bifolius*. In the seventeenth and eighteenth centuries it became a popular curiosity in gardens of Europe where it was known by names such as *Tulipa capensis* (Bodaeus a Stapel, 1644) and *Haemanthus africanus* (Tournefort, 1700). Bulbs of *H. coccineus* continue to be grown in many gardens throughout the world and the inflorescences still appear in the flower markets of Cape Town, albeit illegally, under the name Cape Tulips.

NAMIBIA—2616 (Aus): Farm Kubub, Lüderitz (-CB), *Giess* 11005 (WIND); Aus townlands, *de Winter & Hardy* 7922 (PRE, WIND).

—2715 (Bogenfels): Klinghardt's mountains (-BC), *Dinter* 4450 (K,M), *Williamson* 3254 (BOL).

CAPE—2816 (Oranjemund): South west slopes of Cornells Kop (-BD), *Snijman* 174 (NBG); Helskloof, *Snijman* 172 (NBG); Doring Poort, west side of Ploegberg (-DB), *van Zijl* 106 (K, MO, NBG).

—2817 (Vioolsdrif): 33 km from Eksteenfontein towards Khubus (-CA), *Snijman* 171 (NBG); 10,5 km from Eksteenfontein towards Khubus (-CC), *Snijman* 169 (NBG).

—2916 (Port Nolloth): Port Nolloth (-BD), *Herre* sub SUG 3652 (BOL).

—2917 (Springbok): Karrachab Poort, south of Lekkersing (-AA), *Snijman* 176

(NBG); Latitude 29° 10', longitude 17° 41' (-BA), *van Berkel* 307 (NBG); 4 miles east of Grootmis (-CA), *Hiemstra* 482 (NBG, PRE); Rooivlei (-CC), *van Jaarsveld* 5413 (NBG); Komaggas (-DC), *Herre* sub SUG 3660, SUG 3672 (BOL).

—3017 (Hondeklipbaai): 1 km east of junction of Soebatsfontein/Kamieskroon road towards Killians Pass (-BA), *Snijman* 188 (NBG); 24 miles north west of Garies (-BD), *Salter & Creasey* sub NBG 893/37 (NBG).

—3018 (Kamiesberg): 18 miles south of Garies (-CA), *Stayner s.n.* sub NBG 1026/71 (MO, NBG, PRE); 68 km north of Nuwerus, *van Berkel* 318 (NBG).

—3118 (Vanrhynsdorp): Hillside above Bitterfontein (-AB), *Hiemstra* 410 (NBG); Vanrhynsdorp (-DA), *Strey* 3901 (PRE); Vleikraal, east of Klawer, *Walters* 126 (STE); Sandkraal (-DB), *Smith* 6408 (NBG).

—3119 (Calvinia): Vanrhyns Pass (-AC), *Snijman* 141 (NBG); Second gate between Grasberg and Theunisdriest, *Snijman* 139 (NBG, PRE); Charley-se-Hoek, Nieuwoudtville, *Snijman* 99 (B, K, MO, NBG, PRE, S); 8½ miles north east of Lokenburg (-CA), *Acoccks* 19193 (K, PRE); Mountains above farm Dagbreek (-CB), *Snijman* 358 (NBG); Doornbosch (-CC), *Martin* 1154 (NBG).

—3217 (Vredenburg): Paternoster Bay (-DD), *Axelson* 399 (NBG).

—3218 (Clanwilliam): Lamberts Bay (-AB), *Wagener s.n.* (NBG); Farm Dagbreek, 22 km north of Clanwilliam (-BB), *Roux* 184 (K, MO, NBG, PRE); Brakfontein (-BD), *van Jaarsveld* 4329 (NBG, PRE); 30 km south of Clanwilliam, *Goldblatt* 1847 (MO, NBG); 1½ km south west of Goedverwacht (-DC), *Hardick & Hiemstra* 150 (B, K, MO, NBG, PRE); 20 miles north of Porterville (-DD), *Compton & party* sub NBG 2002/36 (NBG); Piketberg, *Liebenberg* 5590 (PRE); 7 miles north of Piketberg, *Salter* 4425 (BOL).

—3219 (Wuppertal): Gatdeurkop, Algeria Forest Station (-AC), *Viviers* 136 (NBG); New Elands Kloof Pass (-CA), *Thorns* sub NBG 142/47 (NBG); Skoongsig, Koue-Bokkeveld (-CC), *Hanekom* 2093 (PRE); Winkelhaaks River (-DC), *Thorns* sub NBG 397/44 (NBG).

—3220 (Sutherland): 5 km south west of Windheuwel along the Sutherland/Ceres road (-CC), *Snijman* 208 (K, NBG); Northern slopes of Verlatekloof (-DA), *Snijman* 207 (B, K, MO, NBG, PRE); 82 km north of Laingsburg on road to Komsberg via Moordenaars Karoo (-DB), *Snijman* 206 (K, MO, NBG, PRE).

—3317 (Saldanha): Saldanha Bay (-BB), *Lawrence* sub NBG 150/47 (NBG).

—3318 (Cape Town): Ysterfontein (-AC), *Rourke* 1190 (NBG); Farm Geelkuil, near Malmesbury (-BA), *Thompson* 13 (NBG, PRE); 2 miles south of Porterville (-BB), *Loubser* 2082 (NBG), *Loubser* 2100 (NBG); Oudepost (-BC), *Mathews* sub NBG 662/30 (BOL, K); Bokbaai (-CB), *NBG Expedition* sub NBG 910/72 (K, NBG, PRE); Fernwood Buttress (-CD), *Wasserfall* 134 (NBG); Devils Peak, *Marloth* 595 (PRE); In fruticibus clivis Montis Tabularis, *Dümmer* 1346 (E); Table Mountain, *Harvey s.n.* (BM); Vissers Hok (-DC), *Compton* 15625 (BOL, NBG), *Leighton* 439 (BOL); Klein Langverwacht above Kuils River, *Oliver* 3737 (K); Southern slopes of Simonsberg (-DD), *Snijman* 196 (B, K, MO, NBG, PRE); Jonkershoek, *Esterhuysen* 18481 (BOL); Paradise Gorge, Stellenbosch mountain, *Garside s.n.* (K), *Garside* 455 (K).

—3319 (Worcester): De Tronk near Groot Winterhoek (-AA), *Low* 917 (NBG); Hex River Valley (-BC), *H. Bolus s.n.* (BOL), *Snijman* 1 (MO, NBG); Groothoek, *Ashton* 1 (NBG, PRE); Farm Leliefontein, west of Du Toits Kloof (-CA), *Snijman* 149 (NBG, PRE); Worcester (-CB), *van Breda* 10395 (PRE), *Esterhuysen* 10171 (BOL); Worcester Veld Reserve, *Olivier* 68 (STE); Karoo Garden Veld Reserve, *Snijman* 84 (B, K, MO, NBG, PRE); Klein Drakenstein, farm Salem (-CC), *Galpin* 11059 (K, PRE); Foot of Wemmershoek mountains, *Esterhuysen* 18594 (BOL); Bellvue at foot of Jonaskop (-CD), *Snijman* 3 (MO, NBG, PRE); Robertson (-DD), *Melle* sub NBG 2207/15 (BOL).

- 3320 (Montagu): Farm Jagerskraal near Pieter Meintjies station (-AD), *Snijman 200* (NBG); Whitehill Ridge (-BA), *Compton 15614* (NBG), *Olivier s.n.* (NBG); Matjiesfontein, *Bolus* sub NBG 2046/14 (BOL); 36 km north east of Laingsburg along Moordenaars Karoo road (-BB), *Snijman 204* (NBG, PRE); Waboomsberg, farm Highlands (-CA), *Rourke 1666* (NBG, PRE); 25 km west along Witteberg road from junction off Laingsburg/Ladismith road (-CB), *Snijman 202* (B, K, MO, NBG, PRE); Montagu Baths (-CC), *Page s.n.* (BOL); Bellair Dam (-DA), *Rourke 1699* (NBG, PRE).
- 3321 (Ladismith): Ladismith (-AD), *Herre* sub SUG 3665 (BOL); South east of Calitzdorp dam (-BC), *Snijman 406* (MO, NBG, PRE); Huisriver Pass (-DA), *Bruyns 2222* (NBG, PRE), *Snijman 407* (K, MO, NBG); Farm Rietvlei, *Snijman 395* (K, MO, NBG, PRE, S); Calitzdorp Spa, *Snijman 369* (NBG, PRE), *Snijman 396* (NBG); Melkhoutessenbosch, Mossel Bay division (-DC), *Muir 2066* (BOL, PRE).
- 3322 (Oudtshoorn): 5 km from Oudtshoorn towards George (-CA), *Snijman 397* (K, MO, NBG, PRE).
- 3323 (Willowmore): Willowmore (-AD), *Herre* sub SUG 3682 (BOL).
- 3324 (Steytlerville): Farm Dam-se-Drif, Baviaanskloof (-CA), *Snijman 399* (MO, NBG, PRE); 3 km east of Sandvlakte, Baviaanskloof, *Snijman 401* (K, MO, NBG, PRE); Track north of Enkeldoorn, Baviaanskloof, *Snijman 349* (NBG).
- 3325 (Port Elizabeth): Vaaldam, Uitenhage district (-CA), *Marais s.n.* (NBG); Sundays River bridge between Addo and Port Elizabeth (-DA), *Snijman 494* (NBG); Port Elizabeth area (-DC), *Batten s.n.* (NBG); Walmer, *Tarr* sub NBG 994/70 (NBG), *Roux 502* (NBG, PRE), *Urton s.n.* (K, MO, NBG), *Snijman 321* (K, NBG, PRE).
- 3326 (Grahamstown): 1 km south of Doringkom along Kommadagga/Alicedale road (-AC), *Snijman 472* (K, NBG, PRE).
- 3418 (Simonstown): Hills above Kalk Bay (-AB), *Wolley-Dod 952* (BOL); Cape Point, *Middlemost 1668* (MO, NBG); Between Buffels Bay and Paulsberg (-AD), *Leighton s.n.* (BOL); Macassar (-BB), *Nichols 16* (K, NBG, PRE); Elephant Rock Mountain, Betty's Bay (-BD), *Boucher 1471* (K, PRE); Betty's Bay, *Fisher 16* (NBG, PRE), *Snijman 94* (K, MO, NBG).
- 3419 (Caledon): Beach at Onrust River (-AC), *Leighton 414* (BOL); 1 km south west of farm Avontuur along Albertyn/Caledon road, *Snijman 87a* (K, MO, NBG, PRE); Kraal Rock cliffs, Hermanus, *Horrocks 166* (NBG); Danger Point (-CB), *Hiemstra 120* (B, NBG), *Hiemstra 125* (NBG, PRE).
- 3420 (Bredasdorp): De Hoop (-AD), *Snijman 113* (K, NBG, PRE), *Lewis* sub NBG 153/57 (MO, NBG), *Williams s.n.* (NBG); Potberg, *Burgers 2196* (B, NBG), *Burgers 2287* (NBG); Cape L'Agulhas (-CC), *Leighton* in herb. Bol. 657 and 679/33 (K).
- 3421 (Riversdale): Between Ystervarkfontein and Gouritz River Mouth (-BD), *Forrester s.n.* (NBG); Gouritz River Mouth, *Snijman 317* (K, MO, NBG, PRE).
- Inexact localities: Cape Province, *Burchell* bulb No. 129 (K), *Burchell* bulb No. 276 (K).

19. *Haemanthus dasyphyllus* Snijman, sp. nov.

Haemanthus dasyphyllus Snijman species nova; foliis pallidis viridibus, aliquantum tortilibus, pileis longis mollibus vestitis et umbella compacta rubida, distinctur.

Bulbus aggregatus, elongatus-ovoideus, plus minusve rotundus vel lateraliter compressus in sectione transversali, 45–60 mm diam., pro parte maxi-

ma induviatus; tunicas cremeas ad roseas, imbricatas, plus minusve distichas, marginibus obliquis. *Folia* 2, interdum 1, erecta, hysteraantha, anguste ad late lanceolata 190–330 mm longa et 26–70 mm lata, plerumque tortilia, interdum canaliculata, laete viridia, prope basin fasciatis paucibus rubidus lineata; infra vel utrinque pileis longis mollibus vestita; apice acuta. *Pedunculus* ad 230 mm longus, 4–10 mm diametro maximo, rubellus vel cremeus maculis rubidis, molliter pilosus vel glaber. *Umbella* compacta, anguste obconica vel oblonga, 25–50 mm lata. *Valvae spathaceae* 5–6, erectae, floribus breviorae vel longiorae, oblongae-lanceolatae, 30–45 mm longae et 5–20 mm latae, rubidae, firmae sed non crassae, apice subacutae vel obtusatae. *Flores* 20–50, rubri, apice basique albid. *Pedicelli* 4–15 mm longi, albid. *Perianthium* 14–25 mm longum; tubo 3–7 mm longo; segmentis erectis, oblongis vel anguste spathulatis, 11–20 mm longis et 1 mm latis, apicibus obtusatis. *Filamenta* ad 10 mm exserta, rubida; apice albida. *Antherae* apertae 2 mm longae, luteae. *Ovarium* subglobosum, circa 2 mm diam., pallidum viride, stylo stamina aequanti. *Baccae* plus minusve ovoideae, 8–12 mm diam., erubescens. *Semina* plus minusve ovoidea, 6–8 mm diam., atrovinosa.

Type: South Africa, Cape Province, farm Langberg, north west of Loeriesfontein, fl. NBG 4/3/1983, *Snijman 647* (NBG, holotype; K, PRE, isotypes) **Plate 20**.

Bulbs clumped, elongate-ovoid, round or more or less laterally compressed, 45–60 mm diam.; tunics imbricate, distichous, with oblique margins, cream-coloured, mostly covered with light brown papery remains. *Leaves* 2, occasionally 1, erect, appearing after the inflorescence; blade narrowly to broadly lanceolate, 190–330 mm long, 26–70 mm broad at the middle, mostly twisted, sometimes channelled; both surfaces light green with a few red bars at the base of the abaxial surface, mostly covered with long soft white hairs, sometimes on the abaxial surface or margins only; apex subacute. *Peduncle* 30–230 mm long, 4–10 mm across greatest diam., light red or cream with darker red speckling, softly pilose or glabrous. *Umbel* compact, narrowly obconical to oblong, 25–50 mm across. *Spathe valves* 5–6, erect, shorter or as long as the flowers, oblong-lanceolate, 30–45 mm long, 5–20 mm wide, firm, coral to scarlet; tips obtuse or subacute. *Flowers* 20–50, coral to scarlet, white below and on the tips. *Pedicels* 4–15 mm long, whitish. *Perianth* 14–25 mm long; tube 3–7 mm long, swollen below each segment; segments erect, oblong to narrowly spathulate, 11–20 mm long, 1 mm wide; tips obtuse. *Filaments* exerted by up to 10 mm, reddish, tipped with white. *Anthers* 2 mm long when open, yellow. *Style* about as long as the

PLATE 20.

H. dasyphyllus Snijman (*Snijman 647*, farm Langberg) 1 inflorescence \times 1; 2 flower \times 2; 3 infructescence \times 1; 4 bulb and bulblet \times 1; 5 leaves \times 1.



Howard
1923.

HAEMANTHUS DASYPHYLLUS GRAY

filaments. *Ovary* more or less subglobose, about 2 mm diam., light green. *Berries* more or less ovoid, about 8–12 mm diam., flushed with deep to pale pink. *Seeds* more or less ovoid, 6–8 mm across, turning dark wine-coloured.

Flowering time: February to March.

Leafing period: leaves emerge in March and die back in October.

Distribution and habitat: known only from the Langberg and Kubiskouberg, north west of Loriesfontein at altitudes of approximately 900 m above sea level; within an area receiving approximately 100–200 mm rain per annum. Populations are large but localised, found mostly amongst shaley outcrops in Acocks Veld type 28, the Western Mountain Karoo (Fig. 30).

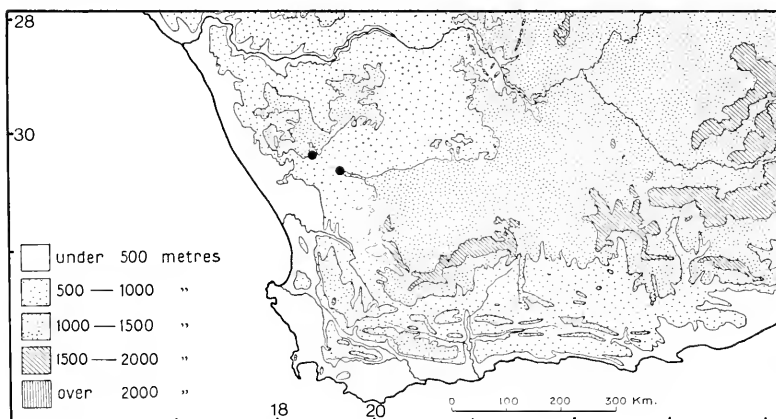


FIG. 30.
Distribution of *H. dasyphyllus* Snijman

Haemanthus dasyphyllus is distinguished by its light green, lanceolate leaves with a covering of long soft white hairs, on both surfaces, the abaxial surface or the edges only. The blades are erect, usually twisted and speckled with red at the base. The inflorescence is compact and scarlet. The peduncle sometimes bears long, soft white hairs and the flowers are surrounded by 5–6 erect oblong-lanceolate spathe valves.

Haemanthus dasyphyllus was first collected by Dr. H. W. R. Marloth in the Kubiskouberg in 1926 and thirty years later by J. P. H. Acocks on the Langberg. Due to the hairiness of the leaves, the specimens were incorporated into the National Herbarium as *H. pubescens* and *H. tigrinus*. However, when M. B. Bayer gathered bulbs from the same area in 1982, it became apparent that these specimens belonged to a distinct species. The colour and markings of the leaves most closely approach those of *H. unifolius*, which differs in being mostly unifoliate and having a covering of short

patent hairs. In contrast the hairs of the bifoliate *H. dasyphyllus* are long, soft and somewhat shaggy.

CAPE—3018 (Kamiesberg): South west of Grootklip, Langberg (-DB), *Acocks 19049* (PRE); Farm Langberg, *Bayer 2770* (NBG), *Bayer 2771* (NBG), *Snijman 647* (K, NBG, PRE), *Snijman 665* (MO, NBG, S).

—3019 (Loeriesfontein): Kubiskouw Mountain (-CD), *Marloth 12857* (PRE).

20. *Haemanthus unifolius* Snijman, sp. nov. Plate 21.

Haemanthus unifolius Snijman species nova; folio plerumque unico, tomentosa a ceteris *Haemanthis* differt.

Bulbus solitarius globosus vel obclavatus, rotundus in sectione transversali vel mediane leviter compressus, 30–55 mm diam., induviatus; tunicas cremas in strata horizontalia marginibus parallelis. *Folium* 1, interdum 2, hysterranthum, obovatum ad anguste obovatum vel ellipticum 100–200 (–490) mm longum, 25–90 (–135) mm latum, erectum vel lateraliter arcuatum, utrinque laete viride, basi rubromaculatum, tomentosum; apice acutum vel obtusatum, glabrum. *Pedunculus* ad 180 mm longus, ellipticus in sectione transversali, 4–10 mm diametro maximo, rubescens, immaculatus, glaber vel sparse hirsutus. *Umbella* obovoidea, mediane compressa, 18–50 mm lata. *Valvae spathaceae* 4–6, erectae, floribus breviorae vel longiorae, oblongae-lanceolatae vel obovatae, 20–45 mm longae, 6–25 mm latae, rubrae. *Flores* 6–30, rubri, apice basique albidu. *Pedicelli* 3–12 mm longi, rosei. *Perianthium* 13–25 mm longum; tubo 2–5 mm longo; segmentis erectis, linearibus vel anguste lanceolatis, 11–21 mm longis et 1–3 mm latis, apicibus acutis vel obtusatis. *Filamenta* ad 8 mm exserta, albida. *Antherae* apertae circa 1,5 mm longae, luteae. *Ovarium* subglobosum, 2–3 mm latum, viride, stylo stamina aequanti. *Baccae* ovoidea, circa 13 mm diam., erubescens. *Semina* ovoidea ad sphaeroidea, 8–10 mm diam., atrovina.

Type: South Africa, Cape Province, 2½ km east of Narapberg, fl. 29/3/1981, *Snijman 416* (NBG, holotype; K, MO, NBG, PRE, isotypes).

Bulb solitary, globose to obclavate, circular in cross section or somewhat compressed in the median plane, up to 55 mm across; tunics unequal, in overlapping horizontal layers, whitish, usually covered with withered brown remains. *Leaf* 1, rarely 2, erect or curved sideways, appearing after the inflorescence; blade narrowly to broadly obovate or elliptic, 100–200 (–490) mm long, 25–90 (–135) mm wide at the middle, narrowing to 5–15 (–30) mm at the base, flat; both surfaces light green, minutely speckled with red towards the base, densely or thinly tomentose; margin often red; apex acute or obtuse, glabrous. *Peduncle* slender, erect, up to 180 mm long, 4–10 mm across greatest diam., pale scarlet, immaculate or very faintly

spotted, glabrous or sparsely covered with soft retrorse hairs. *Umbel* compact, narrowly obovoid, 18–50 mm across. *Spathe* valves 4–6, erect, shorter or longer than the flowers, oblong-lanceolate or obovate, 20–45 mm long, 6–25 mm wide, scarlet, stiff but not fleshy; tips obtuse to acute. *Flowers* 6–30, scarlet with white on the tube and tips. *Pedicels* (3–)5–12 mm long, white to reddish. *Perianth* 13–25 mm long; tube 2–5 mm long, gibbose at the base of each segment; segments erect, linear to narrowly lanceolate or spatulate, 11–21 mm long, 1–3 mm wide; tips obtuse to acute. *Filaments* exerted by up to 8 mm, white. *Anthers* about 1,5 mm long when open, yellow. *Ovary* subglobose, 2–3 mm diam., green. *Style* equalling the stamens. *Berries* ovoid, about 13 mm diam., becoming soft, pulpy and translucent, white to pale pink. *Seeds* ovoid to spherical, 8–10 mm diam., turning dark wine-coloured.

Flowering time: March–April, or a month earlier in cultivation.

Leafing period: from May until September.

Distribution and habitat: large populations occur along the escarpment of Namaqualand, from Kosies in the north to near Soebatsfontein in the south, at elevations of 300–1 200 m above sea level; an area with a rainfall of 125–225 mm per annum. The species occurs mostly on southern slopes in coarse granitic soils, in stony or shrubby terrain, in vegetation referred to by Acocks as Namaqualand Broken Veld (Fig. 31).

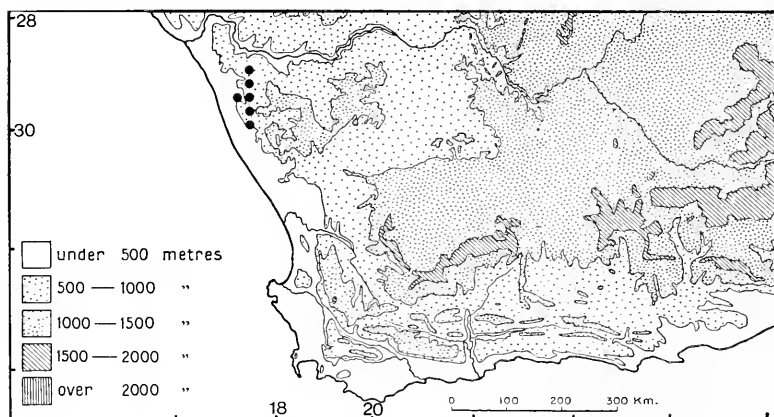
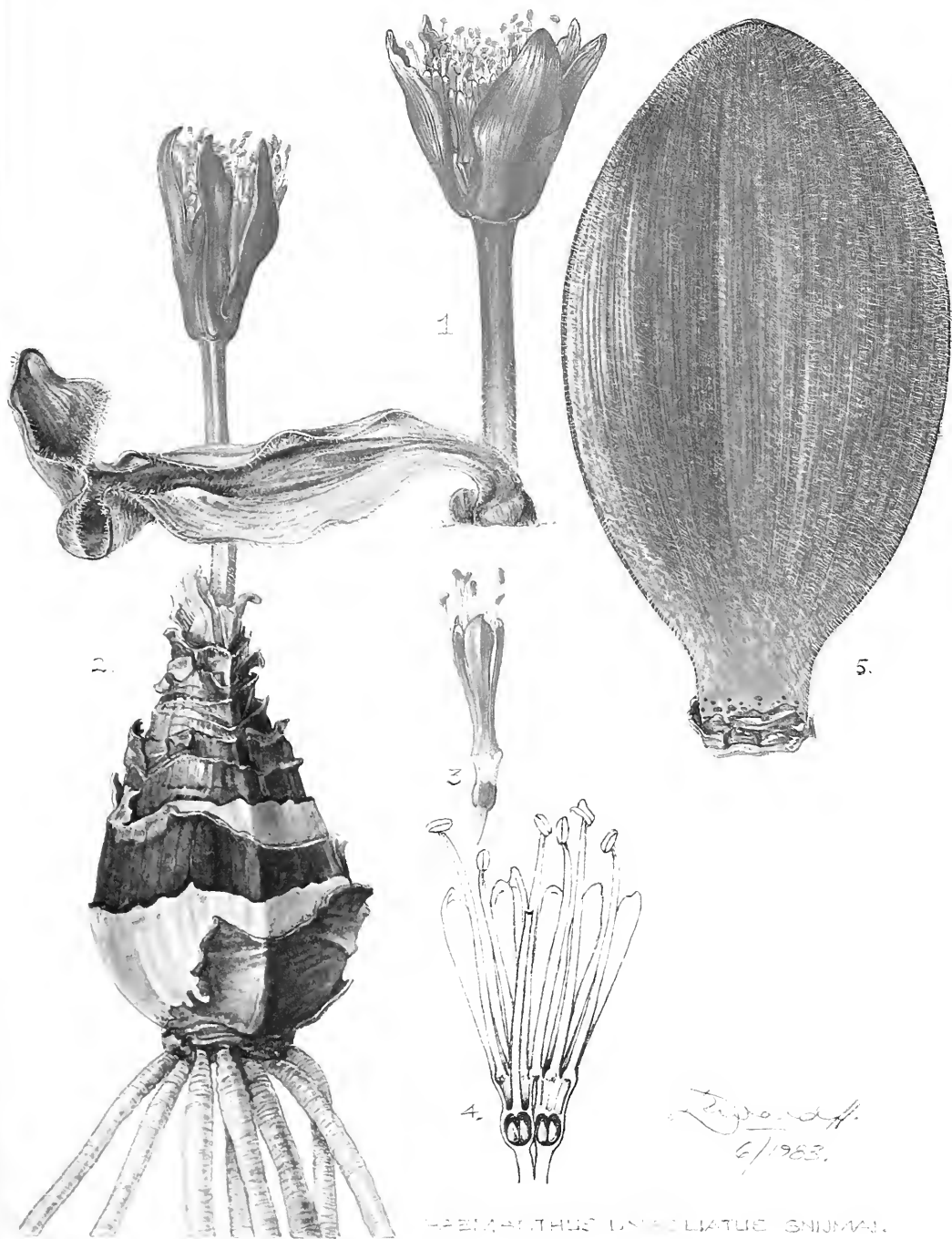


FIG. 31.
Distribution of *H. unifolius* Snijman

PLATE 21.

H. unifolius Snijman (Snijman 181, near Spektakel Pass) 1 inflorescence \times 1; 2 bulb and inflorescence \times 1; 3 flower \times 1,5; 4 section of flower \times 2; 5 leaf \times 1.



LEMNARCHUS UNCINATUS GRISEB.

Haemanthus unifolius is easily distinguished by its solitary, erect, densely tomentose, light green leaves. Only rarely is it bifoliate, in which case it can be recognised by the bulb which is obclavate and round to medianly compressed in cross section with tunics in overlapping horizontal layers. The inflorescence is scarlet and somewhat slender, with 4-6 erect, oblong-lanceolate spathe valves.

All species of *Haemanthus* are unifoliate in the juvenile stages but the majority become bifoliate or occasionally trifoliate at maturity. The only species with persistently unifoliate bulbs are *H. unifolius* and *H. nortieri*. Both species have been cultivated at Kirstenbosch for four years or more, over which time the following leafing patterns have been observed.

Certain bulbs were noted as being single-leaved one year, two-leaved the next and then single-leaved again, which suggests that the few bifoliate bulbs evident in many populations of *H. unifolius* are not persistently two-leaved. Indeed, the bifoliate condition appears to occur only intermittently over many seasons, rather than the same bulb remaining constantly bifoliate each year. The infrequency with which two leaves are produced can be gauged from the morphological studies of Isaac (1937), on *H. nortieri*, who found no evidence to suggest that any of the ten mature bulbs dissected had ever been bifoliate.

Bulbs and leaves of *H. unifolius* were collected by Rev. G. Meyer near Steinkopf in 1927 but flowers were recorded only as recently as 1979.

CAPE—2917 (Springbok): Anenous Pass (-BA), *Müller-Doblies 79115a* (NBG, PRE), *Snijman 177* (MO, NBG), *Snijman 419* (K, NBG); Pypklip Poort, *van Berkel 309* (NBG); 5 km north of the Steinkopf/Port Nolloth road towards Kosies, *Snijman 158* (NBG); At turnoff to Kosies from the Steinkopf/Port Nolloth road, *Snijman 160* (NBG); 2½ km east of Narapberg, *Snijman 416* (K, MO NBG, PRE); Steinkopf (-BC), *Marloth 12657* (PRE), *Meyer sub Marloth 13396* (PRE); Besondermeid, *du Plessis 417* (NBG); Komaggas Reserve (-CB), *van Berkel 301* (NBG); Nigramoep (-DA), *Herre 3539* (BOL), *Herre 3669* (BOL, STE); 20,2 km west of Springbok towards Spektakel Pass, *Snijman 181* (NBG); Spektakel Pass, *van Berkel 120* (MO, NBG); Along the Komaggas/Spektakel road, *van Berkel 303* (NBG); 51,4 km from Springbok towards Komaggas, over Spektakel Pass, *Snijman 182* (K, NBG, PRE); 4 miles north of Komaggas (-DC), *Wisura 1693* (NBG). —3017 (Hondeklipbaai): Near Canariesfontein along road towards Soebatsfontein from Springbok (-BA), *van Berkel 404* (NBG).

21. *Haemanthus pubescens* L.f., Suppl.: 193 (1781); Thunb., Prod. Pl. Cap.: 59 (1794); Baker, Handb. Amaryllid.: 73 (1888) and in Flora Cap.: 241 (1896); Friis & Nordal in Norw. J. Bot. 23: 68 (1976). Type: South Africa, without locality, *Thunberg s.n.*, sheet 7927 in herb. Thunb. (UPS, lectotype, designated by Friis & Nordal, 1976).

Leucodesmis pubescens (L.f.) Raf. non sensu Raf., Flora Telluriana 4: 19 (1838) = *H. albiflos* Jacq.

H. virescens Herbert var. *pubescens* (L.f.) Herbert non sensu Herbert, Amaryllid.: 235 (1837) = *H. albiflos* Jacq.

H. albiflos Jacq. var. *pubescens* (L.f.) Baker non sensu Baker, Handb. Amaryllid.: 68 (1888) and in Flora Cap. 6: 235 (1896) = *H. albiflos* Jacq.

Diacles pubescens (L.f.) Salisb. ex Baker non sensu Baker, Handb. Amaryllid.: 68 (1888) and in Flora Cap. 6: 235 (1896) = *H. albiflos* Jacq.

H. quadrivalvis Jacq., Hort. Schoenbr. 1: 30 t. 58 (1797); Ker Gawler in Bot. Mag. 37: t. 1523 (1813). Type: South Africa, Cape of Good Hope, figure in Jacq., Hort. Schoenbr. 1: t. 58 (1797) (lectotype, designated by Friis & Nordal, 1976).

H. angustifolius Salisb., Prod.: 217 (1796), nom. superfl. Type: as for *H. pubescens* L.f.

H. trispathinus Hort. ex M. Roemer, Syn. Monogr. 4: 37 (1847), nom. nud.

Bulb readily forming bulblets or solitary, narrowly to broadly ovoid, strongly to slightly compressed laterally, 45–80 mm across; tunics fleshly, imbricate, distichous with oblique margins, cream-coloured, turning pink if exposed to light; basal disc sometimes well-developed. *Leaves* 2, rarely 3, recurved to prostrate, appearing after the inflorescence; blade ligulate to oblong, 100–200(–350) mm long, (10–)15–45(–85) mm wide at the middle, flat or channelled; adaxial surface dark green or glaucous, covered with white patent hairs or glabrous; abaxial surface light green or glaucous, unmarked or with a little red spotting at the base, glabrous or sparsely pubescent with long soft hairs; margin ciliate, sometimes red; apex acute to obtuse. *Peduncle* slender to stout, 40–280 mm long, 5–13 mm across greatest diam., red or occasionally pink, unmarked or occasionally with darker markings, glabrous or sometimes pubescent. *Umbel* compact, broadly to narrowly obconical or inversely campanulate, 25–60(–125) mm across near the top. *Spathe valves* 4–5(–7), erect, as long as or much longer than the flowers, lanceolate or broadly to narrowly obovate or spatulate, with a distinct point at the apex, (25–)30–80(–90) mm long, (7–)10–30 mm broad in the upper half, red, rarely pink, stiff and fleshy, waxy, occasionally ciliate on the margins. *Flowers* 4–60, scarlet or rarely pink, with white tubes and tips. *Pedicels* 1–3(–13) mm long, white to reddish. *Perianth* 10–30 mm long; tube 2–5 mm long, distinctly gibbose at the base of each segment; segments erect, linear to narrowly oblong, 13–26 mm long, 0.75–2 mm broad; tips obtuse. *Filaments* exerted by up to 12 mm, scarlet with white tips. *Anthers* 1–2 mm long when open, yellow. *Ovary* subglobose, 2–3 mm diam., light green. *Style* about as long as the stamens. *Berries* large, globose, 16–22 mm diam., pale pink to white, soft and pulpy, in a tight cluster. *Seeds* spherical, about 5 mm diam., dark green to wine-red.

Flowering time: March to April, occasionally in February.

Leafing period: from March to October.

Distribution and habitat: confined to the sandy coastal plain from southern Namibia to Cape Town at elevations less than 300 m above sea level (Fig. 32).

Haemanthus pubescens is easily recognised by the 4 to 5, occasionally 7, large and very fleshy spathe valves which closely surround the flowers. The inflorescence is mostly bright red but sometimes ranges to pink. The leaves are ligulate to oblong and usually pubescent. The bulbs are deep seated and large with fleshy distichous tunics.

For many years *H. pubescens* was thought to occur only in the south western Cape strandveld, but the recent discovery of several populations north of the Olifants river, with leaves ranging from densely pubescent to almost glabrous and flat to channelled, has made it necessary to review the species limits. The fleshy spathe valves of this species, however, are so distinctive and constant in all the known populations that it is considered natural to amplify *H. pubescens* to include the full range of specimens from the west coast strandveld. The consistent differences in vegetative characters between populations, combined with geographical isolation of these populations, has enabled the recognition here of three subspecies. Future collecting, however, may yet reveal continuity throughout the range, thereby making it necessary to revise the status of the currently recognised taxa.

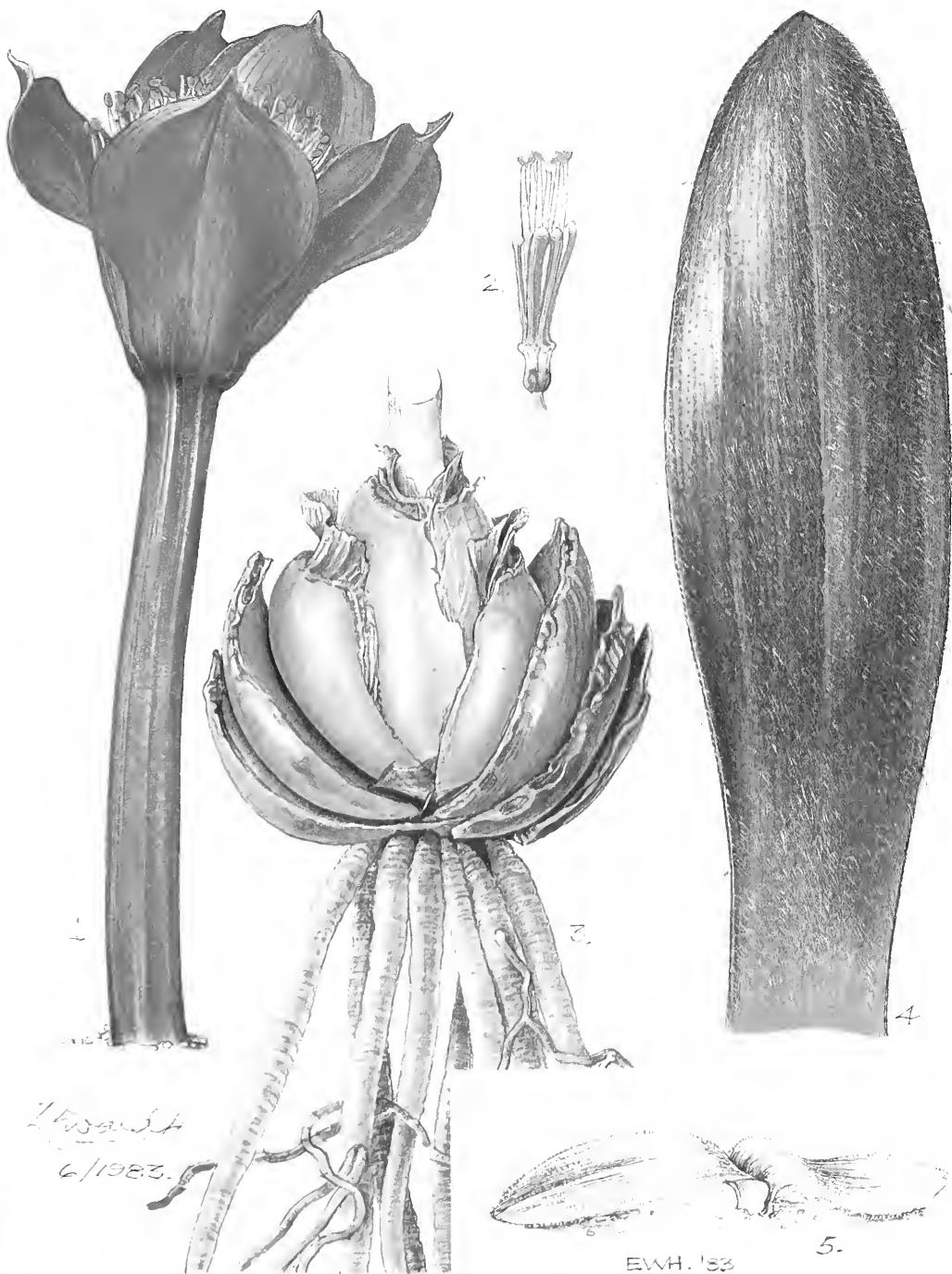
The name *H. pubescens* has been the cause of considerable confusion in the past. Ker Gawler mistakenly applied the name to specimens of *H. albiflos* in a note following table 1523 of *Curtis's Botanical Magazine* (1813) and again in the *Botanical Register* (t. 382, 1819). Loddiges repeated the mistake in the *Botanical Cabinet* (t. 702, 1823). The error apparently arose through comparison of a hairy-leaved form of *H. albiflos* with a sterile specimen of *H. pubescens*, collected by Masson, in the British Museum.

KEY TO THE SUBSPECIES

1. Leaves densely pubescent on the adaxial surface a. subsp. **pubescens**
- 1'. Leaves glabrous on the adaxial surface.
 2. Leaves glabrous on both surfaces, only the margins ciliate; blade plane and prostrate b. subsp. **leipoldtii**
 - 2'. Leaves softly pubescent on the abaxial surface or glabrous; blade channelled and recurved c. subsp. **arenicolus**

PLATE 22.

H. pubescens L.f. subsp. *pubescens* (NBG 28/80, near Malmesbury) 1 inflorescence
 × 1; 2 flower × 1; 3 bulb × 1; 4 leaf × 1; 5 leaf habit.



Nymphaea pubescens Lf. of the water hyacinth

a. subspecies **pubescens**. Plate 22.

Bulb readily forming bulblets, strongly compressed laterally; tunics loose, without persistent dry parts. *Leaves* recurved to prostrate; blade 100–200 mm long, (10–)15–35(–60) mm wide, flat; adaxial surface dark green, covered with patent white hairs; abaxial surface light green, glabrous or rarely sparsely pubescent.

Distribution and habitat: loose sand in the strandveld and coastal fynbos of the south western Cape, from the vicinity of Graafwater to near Somerset West in the south. Rainfall varies from 240 to 525 mm per annum. Several hundred plants occur where populations have remained undisturbed, but decreasing numbers are found in the south, where lowland sites are rapidly being taken up for industrial and urban development (Fig. 32).

Subspecies *pubescens* is the most extensively collected of the subspecies and is well-known throughout the sandy flats of the south western Cape. In comparison with the other subspecies its bulbs most readily form bulblets, contributing to the abundance of individuals in most populations. Throughout its range it varies quite considerably in size. The spathe valves of some individuals are as short as 20 mm or as long as 60 mm, while the leaves range from 10 mm to 60 mm across; however, it is always characterised by the dense pubescence on the adaxial surface and the flat leaf blades.

CAPE—3217 (Vredenburg): Steenberg Cove (-DB), *Barker* 9719 (NBG, PRE); Cape Columbine Lighthouse, Hopefield (-DD), *Hall* (NBG 80951), *Horrocks* (NBG 88671).

—3218 (Clanwilliam): Near Graafwater (-BA), *Thomas* s.n. (NBG); Between Redelinghuys and Aurora (-CB/-DA), *Barker* 9739 (NBG, STE); Half a mile west of Piketberg (-DD), *Hiemstra* sub NBG 888/70 (MO, NBG).

—3317 (Saldanha): Saldanha Bay (-BB), *Marloth* 10194 (PRE), *Hall* 694 (NBG); Hoedjies Bay, *Hall* 710 (NBG, PRE).

—3318 (Cape Town): Donkergat (-AA), *Bayliss* 7293 (NBG); Langebaan, *Marloth* 13179 (PRE); Just north of Berg River near Hopefield (-AB), *Mauve & I. Oliver* s.n. (PRE 58349); Hopefield, *Letty* 108 (PRE); Farm Swartwater, 8 miles north west of Darling (-AD), *Rourke* 1206 (NBG); Farm Adventure near Malmesbury (-BC), *Downton* s.n. sub NBG 28/80 (K, NBG), *Snijman* 106 (B, NBG); Farm La Fontaine, west of Riebeeck Kasteel (-BD), *Snijman* 89 (K, NBG); Between Saxonwold and Mamre (-CB), *Rourke* 1197 (NBG); Milnerton (-CD), *L. Bolus* s.n. (BOL 19154); Farm Boompies, Bellville (-DC), *Olivier* (NBG 93829); Joostenbergvlakte, *Roux* 289 (MO, NBG); Doornhoogte, Cape Flats, *Ecklon & Zeyher* 78.5 (E, PRE); Ridge near Durbanville, *Galpin* 12690 (K, PRE); Klein Langverwacht, *Oliver* 3737 (STE, MO).

—3319 (Worcester): Breede River (-CA), *Mauve & I. Oliver* s.n. (PRE 51861).

—3418 (Simonstown): Macassar, east of Sjeik Josef se Kramat (-BB), *Nichols* 15 (AD, B, K, MO, NBG, PRE).

Inexact localities: Near Cape Town, March 1811, *Burchell* 892 (K); Cape Flats, March 1885, herb. MacOwan 2544 (E); Prom. b. Spei, *Masson* (BM); hort. Stellenbosch, April 1920, *Garside* 1380 (K), South Africa, *Thunberg* s.n. (UPS).

b. subspecies **leipoldtii** Snijman, subsp. nov.

Differt a subsp. *pubescens* foliis utrinque glabris, tantum margine fimbriatis.

Type: South Africa, Cape Province, farm Sandkraal, south of Vanrhynsdorp, fl. 31/3/1981, *Snijman 430* (NBG, holotype; K, MO, PRE, S, isotypes) **Plate 23**.

Bulb mostly solitary, laterally compressed; tunics with light brown papery margins. *Leaves* prostrate; blade broadly oblong, 120–200 mm long, 45–85 mm wide, flat and glabrous; adaxial surface shiny green to glaucous; abaxial surface sometimes speckled with red; margin red, fringed with soft white hairs.

Distribution and habitat: known only from a small area in Namaqualand just north of the Olifants river, where the rainfall is approximately 145 mm per annum. Populations are limited to isolated Restioid and *Eragrostis* communities, where there is an accumulation of wind-blown sand (Fig. 32).

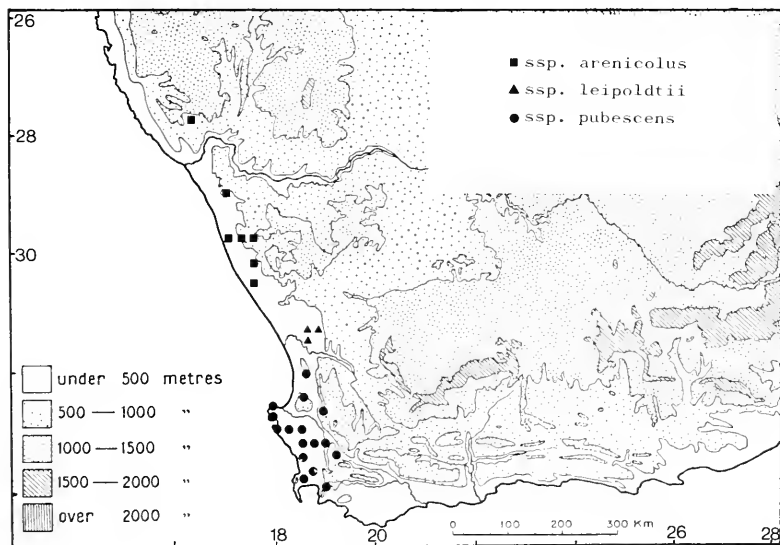


FIG. 32.
Distribution of *H. pubescens* L.f.

Subspecies *leipoldtii* is characterised by its uniformly glabrous, flat leaves with ciliate margins. In addition it sometimes has most striking inflorescences. The number and fleshiness of the spathe valves is similar to those of

the other two subspecies of *H. pubescens*, but in subspecies *leipoldtii* they attain the greatest size in the genus. One collection (*Snijman 430*, NBG) has spathe valves as much as 80 mm long. Specimens with inflorescences intermediate in size between the other subspecies do, however, exist. Furthermore the bulbs of subspecies *leipoldtii* are somewhat similar in appearance to those of subspecies *pubescens* but they do not appear to form bulblets as readily as in the latter taxon.

The subspecific epithet honours Dr. C. L. Leipoldt who was the first to gather bulbs of this taxon.

CAPE—3188 (Vanrhynsdorp): Vieikraal, east of Klawer (-DA), *Walters 122* (STE); 1 mile south of Wiedouw River, *Hall 1082* (NBG); 6,5 km north of Klawer, *Snijman 431* (MO, NBG); Farm Sandkraal, south of Vanrhynsdorp (-DB), *Snijman 430* (K, MO, NBG, PRE, S); Klawer (-DC), *Snijman 432* (K, NBG, PRE).

Inexact localities: Between Klawer and Clanwilliam, *Leipoldt s.n.* (BOL); The weir, Olifants River Valley, *Leipoldt s.n.* (BOL).

c. subspecies ***arenicolus*** Snijman, subsp. nov.

Differt a subsp. *pubescens* foliis angustis (15–40 mm latis), recurvatis, canaliculatis, infra pileis longis mollibus vel glabris.

Type: South Africa, Cape Province, farm Kannikwa 156, about 20 km north east of Port Nolloth, fl. 29/3/1981, *van Berkel 313* (NBG, holotype; PRE, isotype) **Plate 24**.

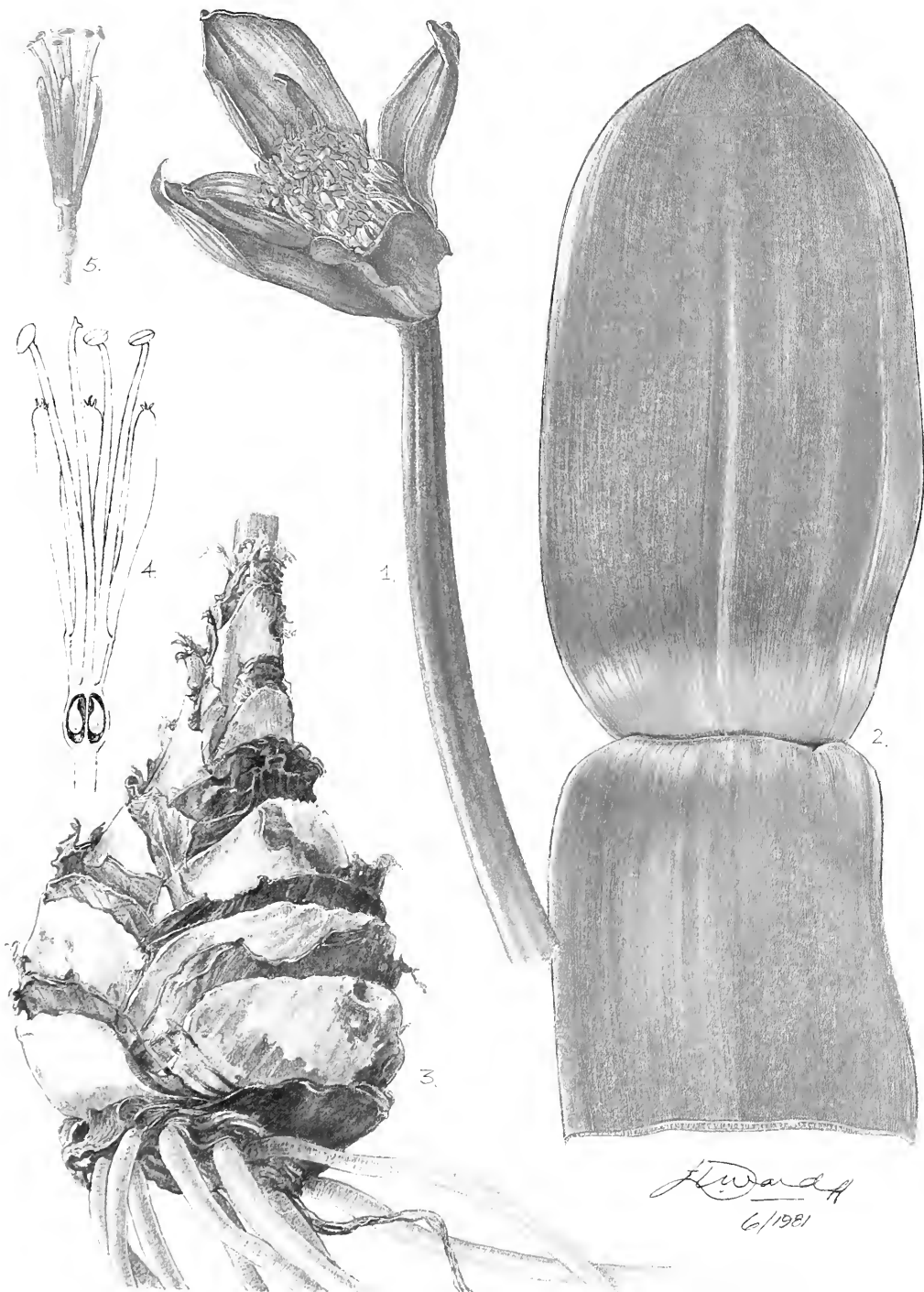
Bulbs forming clumps, more or less laterally compressed; basal disc sometimes well-developed; tunics with light brown papery margins. *Leaves* recurved; blade narrowly ligulate (100–)150–350 mm long, 15–35(–40) mm wide, channelled; adaxial surface glabrous; abaxial surface speckled with red towards the base, rarely immaculate, with a covering of long, soft, white hairs near the edges or over the whole surface, or glabrous; margin red, smooth or fringed with long soft hairs.

Distribution and habitat: confined to the arid coastal plains of southern Namibia and Namaqualand, reaching Soutfontein between Wallekraal and the Groenrivier in the extreme south; an area which receives 60–145 mm rainfall per annum. Populations are very small, consisting of only a few scattered individuals, limited to deep red wind-blown sand and low open succulent veld (Fig. 32).

Haemanthus pubescens subsp. *arenicolus* has a somewhat distinctive

PLATE 23.

H. pubescens L. f. subsp. *leipoldtii* Snijman (*Snijman 430*, farm Sandkraal) 1 inflorescence \times 1; 2 leaves \times 1; 3 bulb \times 1; 4 half flower \times 2; 5 flower \times 1.



Edward
6/1981

HAEMANTIUS PURPUREUS L.F. 89P. LEIFOLDTII SNJMAN

flowering time since the coastal mists of Namaqualand induce the bulbs to flower two to three weeks in advance of most inland species. The bulbs are also somewhat characteristic. The basal disc tends to persist for several years without withering away, thus the bulbs are usually markedly elongated and often have an extended root zone. The basal disc in other taxa invariably remains flat and gives rise to only a narrow ring of roots around its periphery.

Bulbs of this subspecies were first collected in leaf in 1979. Flowers were seen only two years later when the type material was gathered by Mrs. Nicky van Berkel and her husband Fred, in the red sand dunes of the farm Kannikwa, north east of Port Nolloth. Although the distribution is fairly extensive along the Namaqualand coastal plain, bulbs are relatively scarce and widely scattered.

NAMIBIA—2716 (Witputz): Near Spitskop (-DC), *van Berkel 489* (NBG).
—2816 (Oranjemund): East of Buchberg, Alexander Bay (-DC), *Williamson & Leach 2980* (BOL).

CAPE—2917 (Springbok): Farm Oograbies West 153 (-AA), *van Berkel 310* (NBG); Extreme north east corner of farm Kannikwa 156, *van Berkel 313* (NBG, PRE); 10.6 km south of turnoff to Komaggas on road to Soebatsfontein (-CD), *Snijman 187b* (NBG).

—3017 (Hondeklipbaai): Farm Kwoap 494 (-DA), *van Berkel 314* (NBG).

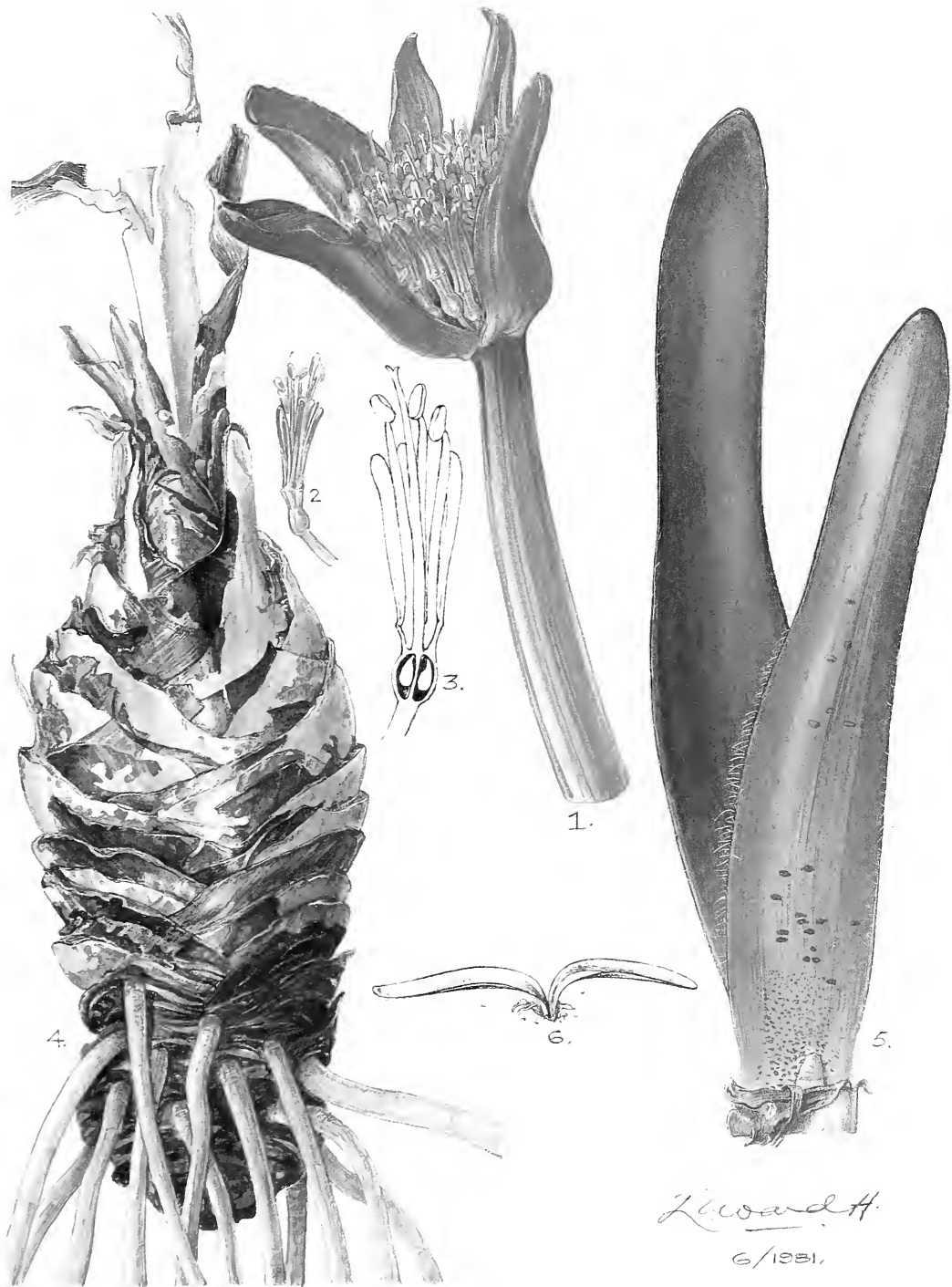
COLLECTIONS OF VEGETATIVE MATERIAL

CAPE—2917 (Springbok): Farm Kleinduin 154 (-AA), *van Berkel 152* (NBG), *van Berkel 272* (NBG); Rooivlei near Kleinzee (-CC), *van Jaarsveld 5413* (NBG); About 1 km south of turnoff towards Komaggas from Soebatsfontein (-CD), *Snijman 186* (NBG); Farm Oubees se Sand (-DC), *van Berkel 175* (NBG).

—3017 (Hondeklipbaai): About 5 km from Wallekraal towards Soebatsfontein (-BC), *van Jaarsveld 5286* (NBG).

PLATE 24.

H. pubescens L.f. subsp. *arenicolus* Snijman (*van Berkel 313*, farm Kannikwa)
1 inflorescence \times 1; 2 flower \times 1; 3 half flower \times 2; 4 bulb \times 1; 5 leaves \times 1; 6 leaf habit.



Léonard H.

6/1981,

HAEMANTHUS PUBESCENS L.f. ssp. *ARENICOLUS* SNIJMAN

EXCLUDED TAXA

The opinions of Friis & Nordal (1976) have been followed for the taxa placed in *Scadoxus* but all remaining taxa have been thoroughly researched.

H. abyssinicus Herbert, Amaryllid.: 232 (1837) = *Scadoxus multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. allisoni Baker in Kew Bull.: App. 2, 43 (1895), nom. nud. The identity of *H. allisoni* is uncertain but as it is listed amongst the new plants grown at Kew in 1894 as being *H. candidus* Hort. ex Bull. it is probably *H. humilis* Jacq.

H. andrei De Wild. in Ann. Mus. Congo 5: 173 (1910) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. angolensis Welw. ex Baker in Jl Bot. 16: 194 (1878) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. arabicus M. Roemer, Syn. Monogr. 4: 42 (1847) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. arnoldianus De Wild. & T. Durand in Bull. Soc. Bot. Belg. 40: 30 (1901) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. bequaerti De Wild., Pl. Bequaert. 1: 44 (1921) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. bivalvis G. Beck in Paulitschke, Bericht über die botanischen Ergebnisse der Expedition, Leipzig. Harar. 452 fig. 1 (1888) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. brachyandrus Baker in Flora Trop. Afr. 7: 391 (1898) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. cabrae De Wild. & T. Durand in Ann. Mus. Congo 2: 56 (1899) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. ceciliae Baker in Kew Bull. : 28 (1906) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. cernuiflorus Ker Gawler ex Drapeiz, Herb. Amat. 4: t. 227 (1830) = *Clivia nobilis* Lindley

H. ciliaris L., Sp. Pl. ed 2: 413 (1762). The specimen annotated “ciliaris” at LINN clearly belongs to the genus *Boophane* Herbert. It is probably *Boophane guttata* (L.) Herbert.

H. ciliaris (L.) Thunb., Prod. Pl. Cap.: 59 (1794) nom. illegit, based on *Amaryllis ciliaris* L. non. *H. ciliaris* L. (1762) = *Boophane ciliaris* (L.) Herbert, according to Baker (1888). Described from a plant in cultivation. The protologue indicates that in 1762 Linnaeus knew the plant only from its leaves. In the *Supplementum Plantarum* (1781), L.f. elaborated the description and provided details of the flowers, the bulb presumably having flowered during the interim. The corolla is described as reflexed, thus *A. ciliaris* L. is clearly not a species of *Haemanthus*.

H. cinnabarinus Decne. in Fl. des Serres **12**: 27 t. 1195 (1857) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. clarkei Hort. in Gard. Chron. **16**: 498 (1894). A garden hybrid between *H. coccineus* and *H. albiflos*, raised by Col. Trevor Clarke at Kew.

H. coccineus Forsskal (non L.) in Flora Aegyptiaco-Arabica: 75 (1775) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. coerulescens Steudel, Nom. Bot. **1** ed. 2: 71 (1840), nom. nud. Listed as a synonym of *Amaryllis capensis* L. = *Spiloxene capensis* (L.) Garside (L.) Garside. See Garside in JI Bot. **74**: 269 (1936).

H. colchicifolius Salisb., Prod.: 216 (1796) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. congolensis De Wild. in JI Soc. Nat. Hortic. Fr. Ser. **4**: 292 (1902) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. cruentatus Schum. & Thonn. in Schum., Beskriv. af Guineiske Planter: 168 (1827) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. cyrtanthiflorus C. H. Wright in JI Linn. Soc. **37**: 529 (1906) = *S. cyrtanthiflorus* (C. H. Wright) Friis & Nordal

H. delagoensis Herbert, Amaryllid.: 233 (1837) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. demeusei De Wild. in JI Soc. Nat. Hortic. Fr. Ser. **4**: 292 (1902) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. diadema Linden ex De Wild. in JI Soc. Nat. Hort. Fr. Ser. 4: 288 (1902) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. distichus (L.f.) L.f. ex Savage in *Herbertia* 4: 97 (1937). Based on *Amaryllis disticha* L.f. Type: South Africa, Cape of Good Hope, *Thunberg* (BM) = *Boophane disticha* (L.f.) Herbert

H. dubius Humboldt, Bonpland & Kunth, Nov. Gen. Sp. 1: 281 (1816) = *Phaedranassa dubia* (H. B. & K) MacBride in Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser. 11: 12 (1931).

H. eetveldeanus De Wild. & T. Durand in Ann. Mus. Congo 2: 56 (1899) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. euryisiphon Harms in Engler Bot. Jahrb. 19: 27 (1894) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. falcatus (Jacq.) Thunb., Prod.: 58 (1794). Based on *Crinum falcatum* Jacq. = *Ammocharis coranica* (Ker Gawler) Herbert, according to Milne-Redhead & Schweickerdt in JI Linn Soc. (Bot.) 53: 170 (1939).

H. fascinator Linden ex De Wild. in JI Soc. Nat. Hort. Fr. Ser. 4: 288 (1902) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. fax-imperi Cuf. in Choivenda et al., Missione Biologica: 322 (1939) = *S. puniceus* (L.) Friis & Nordal

H. filiformis Hiern. ex Baker in JI Bot. 16: 194 (1878) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. germanianus Braun & Schum. in Mitt. Deutsch. Schutzgeb. 2: 145 (1889) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. goetzei Harms in Engler Bot. Jahrb. 30: 276 (1901) = *S. puniceus* (L.) Friis & Nordal

H. grandifolius Balf.f. in Proc. Roy. Soc. Edinb. 12: 96 (1882). Described from a sterile specimen collected near Tamarida, Socotra. Description inadequate, probably not belonging to *Haemanthus*.

H. guttatus Banks ex Herbert, Amaryllid.: 240 (1837), nom. nud., the sheet so annotated in the Banks herb. (BM) = *Boophane guttata* (L.) Herbert, Amaryllid.: 240 (1937).

H. hookerianus Herbert, Amaryllid.: 404 (1837). Described from a solitary specimen without date or collector in the Hooker herbarium (K). The absence of vegetative parts makes the type too incomplete for satisfactory identification. It is probably *H. coccineus* L. or *H. sanguineus* Jacq.

H. humilis A. Chev. in Etudes Fl. Afr. Centr. Franc. 1: 307 (1913), nom. nud. = *S. multiflorus* (Martyn) Raf.

H. hydrophilus Thunb. ex Schultes in Syst. Veg. 7: 892 (1830), nom. nud. The sheets 7919 and 7920 so annotated in herb. Thunberg (UPS) = *Crinum campanulatum* (Herbert) Baker.

H. imperialis Hort. ex Laplace in Rev. Hort. N.S. 21: 221 (1928) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. insignis Hook. in Bot. Mag. 79: t. 4745 (1853) = *S. puniceus* (L.) Friis & Nordal

H. kalbreyeri Baker in Gard. Chron. N.S. 10: 202 (1878) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. katharinae Baker in Gard. Chron. N.S. 7: 656 (1877) = *S. multiflorus* (Martyn) Raf. subsp. *katharinae* (Baker) Friis & Nordal

H. kundianus Braun & Schum. in Mitt. Deutsch. Schutzgeb. 2: 146 (1889) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. laurentii De Wild. in Jl Soc. Nat. Hortic. Fr. Ser. 4: 289 (1902) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. lescauwaetii De Wild. in Gard. Chron. 35 Ser. 3: 274 (1904) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. lindeni N. E. Brown in Illus. Hortic. 37: 89 (1899) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. longifolius (De Wild. & T. Durand) Traub in Plant Life 8: 82 (1952) = *S. longifolius* (De Wild. & T. Durand) Friis & Nordal

H. longitubus C. H. Wright in Jl Linn. Soc. 37: 114 (1905) = *S. multiflorus* (Martyn) Raf. subsp. *longitubus* (C. H. Wright) Friis & Nordal

H. lynesii Stapf in Bot. Mag. **148**: t. 8975 (1923) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. maculatus Jacq. ex Loudon, Hort. Brit. ed. 1: 119 (1830), nom. nud. Identity unknown.

H. magnificus (Herbert) Herbert in Bot. Reg. **27**: Misc. Note 71 (1841) = *S. puniceus* (L.) Friis & Nordal

H. magnificus (Herbert) Herbert var. *gumbletonii* Baker, Handb. Amaryllid.: 66 (1888) = *S. puniceus* (L.) Friis & Nordal

H. magnificus (Herbert) Herbert var. *superbus* Baker, Handb. Amaryllid.: 66 (1888) = *S. puniceus* (L.) Friis & Nordal

H. mannii Baker in Bot. Mag. **104**: t. 6364 (1878) = *S. multiflorus* (Martyn) Raf. subsp. *longitubus* (C. H. Wright) Friis & Nordal

H. membranaceus Baker, Handb. Amaryllid.: 66 (1888) = *S. membranaceus* (Baker) Friis & Nordal

H. micrantherus Pax in Engler Bot. Jahrb. **15**: 140 (1892) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. mildbraedii Perkins in Mildbraed, Wissenschaftlichen Ergebnisse der Deutschen Zentral-Africa-Expedition: 64 (1910) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. mirabilis Linden in Gard. Chron. **29**: 332 (1901) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. multiflorus Martyn, Monograph with plates: with no page number (1795) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. natalensis Pappe ex Hook. in Bot. Mag. **89**: t. 5378 (1863) = *S. puniceus* (L.) Friis & Nordal

H. nicholsoni Baker in Flora Trop. Afr. **7**: 392 (1898) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. nutans Friis & Bjørnstad in Norw. J. Bot. **18**: 227 (1971) = *S. nutans* (Friis & Bjørnstad) Friis & Nordal

H. obliquus Donn, Hortus Cantab. ed. 2: 38 (1800). The name given to a bulb cultivated at the Cambridge Botanic Garden as early as 1794 and originally from the Cape of Good Hope. Probably *H. coccineus* L. or *H. sanguineus* Jacq., description inadequate.

H. orbicularis Donn, Hortus Cantab. ed. 2: 38 (1800). Listed amongst the plants grown in the Cambridge Botanic Garden; introduced in 1790 from the Cape of Good Hope. Probably *H. coccineus* L. or *H. sanguineus* Jacq., description inadequate.

H. orbicularis Fischer ex M. Roemer, Syn. Monogr. 4: 43 (1847), nom. nud. Probably *H. coccineus* L. or *H. sanguineus* Jacq.

H. orchidifolius Salisb., Prod.: 217 (1796) = *S. puniceus* (L.) Friis & Nordal

H. orientalis (L.) Thunb., Prod. Pl. Cap.: 59 (1794). Based on *Amaryllis orientalis* L. = *Brunsvigia orientalis* (L.) Aiton ex Ecklon. See Dyer in Plant Life 7: 47 (1951).

H. otaviensis Dinter in Fedde Repert. 29: 258 (1931) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. pole-evansii Oberm. in Fl. Pl. Afr. 37: pl. 1952 (1965) = *S. pole-evansii* (Oberm.) Friis & Nordal

H. pseudocaulus Bjørnstad & Friis in Norw. J. Bot. 19: 219 (1972) = *S. pseudocaulus* (Bjørnstad & Friis) Friis & Nordal

H. pseudocaulus Bjørnstad & Friis subsp. *prorumpens* Bjørnstad & Friis in Norw. J. Bot. 19: 221 (1972) = *S. pseudocaulus* (Bjørnstad & Friis) Friis & Nordal

H. pubescens Blanco, Fl. Filip. ed. 2: 253 (1845), nom. illegit. A later homonym of *H. pubescens* L.f. Probably a Philippine species and not belonging to *Haemanthus*.

H. puniceus L., Sp. Pl. ed. 1: 325 (1753) = *S. puniceus* (L.) Friis & Nardal

H. puniceus L. var. *fortuita* Herbert, Amaryllid.: 233 (1837) = *S. puniceus* (L.) Friis & Nardal

H. puniceus L. var. *magnificus* Herbert in Bot. Mag. **67**: sub t. 3870 (1941) = *S. puniceus* (L.) Friis & Nordal

H. radcliffei Rendle in JI Linn. Soc. **37**: 223 (1905) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. redouteanus M. Roemer, Syn. Monogr. **4**: 38 (1847) = *S. puniceus* (L.) Friis & Nordal

H. redouteanus M. Roemer var. *subalba* M. Roemer, Syn. Monogr. **4**: 38 (1847) = *S. puniceus* (L.) Friis & Nordal

H. roseus Hort. ex Link, Enum. Hort. Berol.: 309 (1821). The description is based on a bulb grown at the Botanic Garden Berlin, which appears never to have been preserved. The description of the leaves and the specific epithet, which probably alludes to the colour of the flowers, suggest that it could either be *H. humilis* Jacq. or *H. carneus* Ker Gawler.

H. rotularis Baker in Gard. Chron. N.S. **7**: 656 (1877) = *S. cinnabarinus* (Decne.) Friis & Nordal

H. rouperi Hort. in Floral Mag. N.S.: t. 148 (1875) = *S. puniceus* (L.) Friis & Nordal

H. rupestris Baker in Gard. Chron. N.S. **7**: 656 (1877) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. sacculus Phillips in Fl. Pl. S. Afr. **14**: pl. 531 (1934) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. sarniensis (L.) Thunb., Prod. Pl. Cap.: 58 (1794). Based on *Amaryllis sarniensis* L. = *Nerine sarniensis* (L.) Herbert, according to the original description.

H. sereti De Wild. in Ann Mus. Congo **5**: 173 (1910) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. sessiliflorus Dinter in Fedde Repert. **29**: 258 (1931). Type: Namibia, Buchuberge, 1/7/1929, *Dinter 6471* (B) = *Massonia* sp.

H. sinuatus Thunb. ex Schultes, Syst. Veg. **7**: 892 (1830), nom. nud. The

sheet No. 7933 so annotated in herb. Thunberg (UPS) is *Boophane disticha* (L.f.) Herbert.

H. somaliensis Baker in Kew Bull.: 227 (1895) = *S. multiflorus* (Martyn) Raf., possibly subsp. *multiflorus*

H. spathulatus Hort. ex M. Roemer, Syn. Monogr. 4: 43 (1847), nom. nud. As bulbs bearing the name were probably never preserved, the identity remains unknown.

H. speciosus Colla, Hort. Ripul.: 63 (1824), nom. nud. Identity unknown.

H. spiralis L.f. ex Aiton, Hort. Kew ed. 1: 405 (1789) = *Carpolyza spiralis* (L'Hérit.) Salisb. See Leighton in Jl S. Afr. Bot. 14: 81 (1948).

H. stellatus Steudel, Nomen. bot. ed. 2 Vol. 1: 71 (1840), nom. nud. Listed as a synonym of *Amaryllis capensis* L. = *Spiloxene capensis* (L.) Gar-side in Jl Bot. 74: 269 (1936).

H. tenellus (L.f.) Steudel, Nomen. bot. ed. 1: 238 (1821). Based on *Crinum tenellum* L.f. = *Hessea tenella* (L.f.) Oberm. in Fl. Pl. Afr. 36: pl. 1413 (1964).

H. tenuiflorus Herbert in Bot. Mag. 67: t. 3870 (1841) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. tenuiflorus Herbert var. *coccineus* Hook. in Bot. Mag. 97: t. 5881 (1871) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. tenuiflorus Herbert var. *mocambicensis* Herbert in Bot. Mag. 67: t. 3870 (1841) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. toxicarius L.f. ex Aiton, Hort. Kew ed. 1 Vol. 1: 405 (1789), nom. illegit., based on *Amaryllis disticha* L.f. Type: South Africa, Cape of Good Hope, Thunberg (BM) = *Boophane disticha* (L.f.) Herbert

H. undulatus (L.) Thunb., Prod. Pl. Cap.: 58 (1794). Based on *Amaryllis undulatus* L. Not *Haemanthus*, probably *Nerine undulata* (L.) Herbert, according to the original description.

H. vaginans Thunb., Flora Cap. 2: 254 (1820). Not *Haemanthus*, probably *Strumaria truncata* Jacq., according to the original description.

H. vaginatus Thunb., Prod. Pl. Cap.: 188 (1794) Type: sheet No. 7937 in Thunberg herb. (UPS) = *Strumaria truncata* Jacq.

H. zambesiacus Baker in Flora Trop. Afr. 7: 387 (1898) = *S. multiflorus* (Martyn) Raf. subsp. *multiflorus*

H. zebrinus Herbert, Amaryllid.: 237 (1837). Described from a bulb which never flowered and which probably was never preserved. From the description it does not appear to be an unknown species.

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